RESEARCHES OF THE DEPARTMENT OF
TERRESTRIAL MAGNETISM

VOLUME VIII

Land and Ocean Magnetic Observations
1927-1944

W. F. WALLIS and J. W. GREEN

Typical Views of Magnetic Stations

1. Extent of small low flat on which stations were located at Hop, Norway
2. Magnetic station, Chengchow A, China
3. Davies in small observatory, Little America I
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8. Carnegie, under full sail, view from port side, Pacific Ocean, November 14, 1928

RESEARCHES OF THE DEPARTMENT OF TERRESTRIAL MAGNETISM

VOLUME VIII

M. A. TUVE, Director
J. A. FLEMING, Director
(Retired June 30, 1946)

Land and Ocean Magnetic Observations, 1927-1944

By

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LAND AND OCEAN MAGNETIC OBSERVATIONS, 1927-1944

INTRODUCTION

This volume is the eighth of the series by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington bearing the general title "Researches of the Department of Terrestrial Magnetism" designated Publication No. 175.

Results of land magnetic observations were given in Volumes I, II, IV, VI, and VII, and are continued in the present publication. Results of magnetic observations at sea on the Galilee and Carnegie were given in Volumes III and V.

The results of land magnetic observations published in the series may be summarized as follows:

Volume I--"Land Magnetic Observations, 1905-1910," published 1912, contains the data obtained at stations from the beginning of the Department's field-work in February, 1905, to the end of December, 1910.

Volume II--"Land Magnetic Observations, 1911-1913, and Reports on Special Researches," published 1915, contains the results of all magnetic observations made on land during the three years January, 1911, to December, 1913.

Volume IV--"Land Magnetic Observations, 1914-1920, and Special Reports," published 1921, contains the results of all magnetic observations made on land during January, 1914, to December, 1920.

Volume VI--"Land Magnetic and Electric Observations, 1918-1926," published 1927, contains data from land magnetic observations for the period 1921-1926 and the arctic observations made on the Maud Expedition, 1918-1925.

Volume VII-(A), (B)--"Magnetic Results from Watheroo Observatory, Western Australia, (A) 1919-1935; (B) 1936-1944," published 1947, contains hourly mean values of data obtained with recording instruments throughout the 26-year period.

Volumes on ocean magnetic observations published in the series are as follows:

Volume III--"Ocean Magnetic Observations, 1905-1916, and Reports on Special Researches," published 1917, presents the final ocean magnetic data obtained aboard the Galilee in the Pacific Ocean, 1905-1908, and aboard the Carnegie in the Atlantic, Indian, and Pacific Oceans, 1909-1914, together with the preliminary data from observations made during 1915 to 1916 on the Carnegie's Cruise IV.

Volume V--"Ocean Magnetic and Electric Observations, 1915-1921," published 1926, contains final result of magnetic measurements made on Cruises IV, V, and VI of the Carnegie in the years 1915 to 1921.

The present volume contains two extensive tables of magnetic results (one for land and one for the oceans) for the 18 years from 1927 to 1944. The methods, notations, instruments, and general particulars pertinent to these results are but briefly summarized here; for further details, reference should be made to earlier volumes of the series, particularly to Volume VI for land work and to Volume V for ocean work. The volumes of magnetic results have met with cordial reception in the past, and the Department has noted with keen satisfaction various valuable discussions of geomagnetism, published elsewhere, based on the data of this series, as well as the wide use of these data in preparing geomagnetic charts for navigation and geographic maps. It is hoped that the present volume, though less extensive than those published previously, may yet contain sufficient new material to stimulate fresh efforts and studies in geomagnetism.

As heretofore, detailed reports by field observers and descriptions of stations are included for those contemplating expeditions to regions visited by the Department's observers.

It is a pleasure to acknowledge the cordial and valuable assistance, so indispensable to the furtherance of land magnetic surveys, received from the magnetic institutions, the government officials, and diplomatic representatives of the countries visited, from others in public office, from representatives of various organizations, and from individuals acting from personal interest. The very abundance of assistance so received makes impracticable separate acknowledgments. John A. Fleming, Director until June 30, 1946, the present Director, M. A. Tuve, and the Chief of the Section of Land Magnetic Survey desire to express their appreciation not only to the observers whose names appear in this volume in connection with the records of their work, which are ample testimonials to their efforts and faithfulness, but also to those who have worked at the less conspicuous though highly responsible and equally essential tasks of constructing and maintaining the field-instruments and of making the reductions and preparations for publication, namely, the instrument-makers in the shop, and the computers, revisers, and tabulators in the office.

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LAND MAGNETIC OBSERVATIONS, 1927-1944

LAND AND OCEAN MAGNETIC OBSERVATIONS, 1927-1944

SUMMARY OF LAND WORK, 1927-1944

Many results here presented have previously been supplied in manuscript in preliminary form to those interested in magnetic charts, geographic maps, and the industrial or commercial applications of land magnetic data. Although the needs of many have thus been met prior to publication, the present volume provides a systematic tabulation of all the data collected and contains the final revisions of results.

The general magnetic survey of the globe was completed in 1926 for the major part of the Earth. This task was accomplished largely through the activities of this department, especially on the oceans, and on land in countries where facilities for gathering magnetic data were limited. Ocean observations ceased in 1929 when the nonmagnetic ship Carnegie was destroyed before completing its seventh cruise. Since 1929, the Department has confined its magnetic surveys to land areas, and the survey of the oceans, for lack of a suitable survey ship, has been neglected. Accordingly, the present situation with regard to data for magnetic charts is unsatisfactory, as it is not now possible to construct world magnetic charts as accurately as was possible one or two decades ago, except in limited regions.

Since 1926 many surveys have been carried out on land in co-operation with other organizations and explorers. Valuable data in polar regions were obtained in co-operation with the two Byrd Antarctic expeditions, the United States Antarctic expedition, the Louise A. Boyd expedition, the Baffin Land and North Greenland expeditions of MacMillan and McGregor, the Army Air Forces Survey of 1943, the Wilkins-Ellsworth Transarctic Submarine expedition, and parties of the second International Polar Year, 1932-1933. In Australia, since 1936, magnetic surveys have been made annually in co-operation with the Bureau of Mineral Resources, Geology and Geophysics, of the Department of Supply and Shipping.

A major purpose of the observing program has been that of securing secular-variation data through reoccupation of magnetic stations established previously. However, it has been possible to obtain a limited number of new results in regions heretofore unvisited by magnetic observers, such as certain parts of South America, Asia, and Antarctica.

Until 1926 a fairly good distribution of repeat-stations had been obtained in the South Pacific, Australia and New Zealand, Central and South America, the West Indies, and Africa. Since 1926 the majority of the stations occupied have been in Africa, Australasia, southern Asia, and South America, thereby providing additional material for the study of secular change.

Summaries of stations occupied, with the data arranged according to country and arbitrary geographical division, show the distribution of the Department's observations and indicate the general scope of the surveys.

The classification of stations as to types and the methods of enumerating stations and station-occupations in the present volume closely follow those described in Volume VI.

Table 1 summarizes under major geographical divisions the Department's land operations for the period from 1905 to 1944, thus including previous land-survey data as well as the data tabulated in the present volume.

Table 1. Summary of land operations, 1905 to 1944

Geographical Divisions	Station-occupations					Totals 1905 to 1944	
	Volume						
	I 1905-1910	II 1911-1913	IV 1914-1920	VI 1921-1926	VIII 1927-1944	Occupations	Expeditions[a]
Africa	389	191	481	113	199	1,373	28
Asia	323	82	405	353	117	1,280	29
Australasia	11	284	336	117	161	909	35
Europe	42	36	32	24	15	149	7
North America	368	50	139	202	142	901	53
South America	115	248	369	240	166	1,138	30
Islands:							
Atlantic	77	16	20	203	24	340	13
Indian	1	14	33	71	4	123	5
Mediterranean	2	2	...	4	...	8	3
Pacific	64	16	106	75	44	305	14
Antarctic Regions	...	31	...	...	23	54	3
Totals	1,392	970	1,921	1,402	895	6,580	220

[a] Including expeditions engaged in other operations and special work

In Volume VI new descriptive designations were introduced for stations; the designations adopted are given here in order that the various summary tables may be readily interpreted.

Station--This designation refers to any position of an instrument used in magnetic observations which, in regions of great local disturbance, may be displaced with reference to another station by but a short distance, either horizontally or vertically. A station is designated "primary" when all three magnetic elements are determined, except in certain cases as outlined below.

Locality--No fixed rule can be laid down with reference to the distance between stations regarded as being in the same locality, and each case is decided according to local magnetic conditions. In general, a locality is not taken so large that the value of any element changing normally would have appreciably different values at opposite limits. The limits for a "proximate" reoccupation have been taken as five kilometers (three miles), but stations separated by this distance may be regarded as being in the same or separate localities, depending upon magnetic conditions. In regions of known local disturbance, as, for example, in Bermuda, much narrower limits necessarily are taken.

Occupation--A visit of an observer to a locality for making observations is considered an occupation, whether a complete or only a partial program of observations has been carried out. Where more than one observer constitutes the party, only one occupation is enumerated; but where the observers, traveling as separate parties, reach a locality at or about the same time, the number of occupations is the number of parties making the observations. For example, when the party from the Carnegie and a field-observer reach a station simultaneously, two occupations are counted.

Reoccupation--An occupation of a locality previously occupied by a CIW observer or party is considered a reoccupation. It has not been possible to include a classification for the reoccupation of stations established by observers of other organizations, although the number of these constitutes a large and important source of the available secular-variation data. When an observer returns to a locality which he has himself occupied, it is regarded as reoccupation only in case other distant localities have been occupied in the interval, in general not less than one month. Exceptions to this rule are made in the case of base-stations, winter-quarters in the polar regions, observatory sites, and other semipermanent stations, where observations are made intermittently over long periods. Such stations are counted as repeat-stations (see definition below), but the number of reoccupations is limited according to circumstances. At permanent observatories, such as the Watheroo and Huancayo magnetic observatories, each year's work is counted as a reoccupation, a wholly arbitrary but reasonable rule, since secular-change data result. Visits to these observatories by field-parties for comparison of instruments are not regarded as reoccupations. The limitations with regard to the number of observers or parties are the same as for an occupation.

Auxiliary station--Whenever an observer makes observations at more than one station in a locality at the same visit, an extra station is counted, and these are classified as auxiliary and secondary. An auxiliary station is an extra station at which all three elements have been observed. Sometimes, as at observatories, different positions are used for the determination of the different elements, and these are combined so as to provide one auxiliary station for the complete program.

Secondary station--Stations employed for the determination of but one or two of the elements are classed as secondary stations. Exception is made in case of observatories where two or more piers are provided for separate use of magnetometer and inclinometer, and in a few instances where two or more observers have divided the program, using different stations for magnetometer and dip circle or earth inductor. If, however, the same element is observed at both points, as D and H at one and D and I at the other, a primary and a secondary station are recorded.

Secondary locality--No use has been made of this class of points, relatively small in number, at which the observer has been unable to secure observations for all elements. An occupation is credited to the observer, though only a secondary station is enumerated.

Repeat-localities--Reoccupations are exact, close, practical, or proximate, according to the distance of the new station from the former. The reoccupation is regarded as exact when close enough to employ the previously determined azimuths without appreciable error, close when within 30 meters, practical when within 300 meters, and proximate when at a greater distance up to five kilometers or to the limit regarded as defining the locality.

Table 2 summarizes somewhat differently than in Table 1 all of the Department's land results for the past 40 years, classifying the station-occupations according to the preceding definitions and giving the number of repeat-localities and repeat-occupations.

SECULAR-VARIATION STATIONS

Table 3 gives the distribution of observations for secular variation made from 1905 to 1944, according to continent, country, locality, and number of occupations. The arrangement by country is not always rigidly adhered to; for example, in the West Indies and Central America a number of countries are grouped as a matter of convenience.

Table 4 summarizes the totals of repeat-localities in various arbitrarily chosen geographical divisions.

Table 2. Summary of station-occupations by type and repeat localities, 1905 to 1944

Geographical Divisions	Station-Occupations			Repeat-Localities	
	Primary	Auxiliary	Secondary	Number	Occupations
Africa	1,205	145	23	169	409
Asia	865	150	265	94	247
Australasia	762	67	80	131	416
Europe	102	36	11	15	41
North America	700	147	54	94	293
South America	929	172	37	135	442
Islands:					
Atlantic	167	126	47	34	100
Indian	96	18	9	5	16
Mediterranean	8	...	...	3	6
Pacific	220	52	33	52	139
Antarctic Regions	44	1	9	4	8
Totals	5,098	914	568	736	2,117
Total station-occupations					6,580

Table 3. Repeat-localities and occupations for determination of magnetic secular-variation, 1905 to 1944

Geographical divisions and subdivisions	Repeat-localities and occupations	Totals	
		Localities	Occupations
AFRICA			
Abyssinia	Addis Abeba, 2; Dire Daoua, 2; Hawash, 2	3	6
Algeria	Algiers, 5; Oran, 2.	2	7
Algerian Sahara	Touggourt, 2	1	2
Anglo-Egyptian Sudan	Port Sudan, 4; Gondokoro, 3.	2	7
Angola	Benguela, 2; Boma, 2; Cabinda, 2; Cassoalala, 2; Chinguar, 2; Chissamba, 2; Cuanza, 2; Huambo, 4; Loanda, 6; Lobito, 3; Malange, 3; Mossamedes, 3; Moxico, 2; Xinguari, 2	14	37
Belgian Congo	Banana, 3; Basongo, 2; Bolobo, 3; Boma, 4; Elisabethville, 2; Kambove, 2; Kwamouth, 2; Leopoldville, 3; Luebo, 2; Lusambo, 2; Matadi, 4; Ruwe, 2	12	31
Cameroun	Douala, 3; Garoua, 3; Olama, 2	3	8
Egypt	Alexandria, 2; Helwan Observatory, 6; Suez, 6; Tor, 3	4	17
Eritrea	Asmara, 2; Massaua, 3	2	5
French Equatorial Africa	Bangui, 2; Bol, 2; Brazzaville, 3; Fort Archambault, 2; Fort Crampel, 2; Fort Lamy, 4; Fort Sibut, 2; Libreville, 2; Miltou, 2; Port Gentil, 3	10	24
French Somaliland	Jibuti, 3	1	3
French West Africa	Abidjan, 2; Ansongo, 2; Bouaké, 2; Bourem, 2; Conakry, 2; Cotonou, 2; Dakar, 2; Gaya, 2; Grand Bassam, 2; Kayes, 2; Koulikoro, 2; Mamou, 2; Matam, 2; Mopti, 2; Niafunké, 2; Niamey, 2; Parakou, 2; Podor, 2; Savé, 2; Segou, 2; St. Louis, 2; Timbuktu, 2	22	44
Gambia	Bathurst, 2	1	2
Gold Coast Colony	Accra, 3; Kumasi, 2; Sekondi, 3	3	8
Kenya	Kisumu, 4; Makindu, 2; Mombasa, 3; Nairobi, 4; Nakuru, 3; Voi, 2	6	18
Liberia	Cape Palmas, 3; Cuttington, 2; Harper, 2	3	7
Morocco	Casablanca, 2; Larache, 2; Mogador, 2; Rabat, 2; Tangier, 2	5	10
Nigeria	Amar, 2; Dikoa, 2; Ibi, 2; Jebba, 2; Kano, 2; Lagos, 3; Lokoja, 2; Yola, 2; Zaria, 2	9	19
Northern Rhodesia	Livingstone, 2; Broken Hill, 2	2	4
Portuguese East Africa	Beira, 2; Boane, 2; Chinde, 2; Lourenço Marques, 2; Matola, 2; Mopea, 2; Mozambique, 3; Pessene, 2	8	17
Sierra Leone	Bo, 2; Freetown, 3; Moyamba, 2	3	7
Southern Rhodesia	Bulawayo, 2; Hartley, 2; Salisbury, 2; Umtali, 2; Victoria Falls, 3	5	11
South-West Africa	Aus, 3; Gibeon, 3; Kalkfeld, 2; Karibib, 2; Keetmanshoop, 3; Otavi, 2; Seeheim, 3; Swakopmund, 3; Tsumeb, 2; Windhoek, 3	10	26

Table 3. Repeat-localities and occupations for determination of magnetic secular-variation, 1905 to 1944--continued

Geographical divisions and subdivisions	Repeat-localities and occupations	Totals	
		Localities	Occupations
AFRICA--concluded			
Tanganyika	Dar es Salaam, 3; Kilossa, 2; Ngere Ngere, 2; Tabora, 4	4	11
Tripolitania	Tripoli, 4	1	4
Tunisia	Sfax, 2; Tunis, 3	2	5
Uganda	Entebbe, 2; Hoima, 2; Kampala, 2; Kiriba (Rejaf), 2	4	8
Union of South Africa	Beaufort West, 2; Bethlehem, 2; Bloemfontein, 2; Cape Town, 5; Cape Town Observatory, 2; Cradock, 2; De Aar, 2; Durban, 2; Durban (Bluff), 2; East London, 2; Eendekuil, 2; Gingindhlovu, 3; Hollerivier, 2; Hutchinson, 2; Karree, 2; Machadodorp, 2; Mafeking, 3; Matjesfontein, 2; O'okiep, 2; Orange River, 2; Potgietersrust, 2; Pretoria, 4; Springfontein, 2; Uitenhave, 2; Van Rhynsdorp, 2; Warrenton, 2; Wolseley, 2	27	61
	Totals for Africa	169	409
ASIA			
Arabia	Aden, 7; Jidda, 3; Kuwait, 2	3	12
Asiatic Russia	Ayon Island (winter-quarters 1919-1920), 2; Bear Island (winter-quarters 1924-1925), 2; Cape Serdze Kamen (winter-quarters 1920-1921), 2; Kain-ge-skon, 3; No. 35 (68 N 165 E), 2; Winter-quarters 1918-1919, 2	6	13
China	Amoy, 2; Canton, 15; Changsha, 2; Changte, 2; Chengchang, 2; Chengchow, 6; Chengtu, 2; Chinchowfu, 2; Chinkiang, 2; Chuanchow, 2; Chungking, 2; Foochow, 2; Fowchow, 2; Hangchow, 2; Hankow, 4; Hengchow, 3; Hongkong, 8; Ichang, 4; Ipin, 2; Kalgan, 3; Kiukiang, 2; Kweichowfu, 2; Kweilin, 2; Lanchowfu, 2; Liangchowfu, 2; Loshan (Kiating), 2; Lukiapang, 3; Mengtsz, 2; Nanchang, 3; Nanking, 2; Nanning, 2; Newchwang, 2; Ningpo, 2; Pahsien 2; Peiping 1907, 4; Peiping 1916, 4; Pingfan, 2; Shanhaikwan, 2; Shasi, 2; Shenchow, 2; Shiuchow, 3; Sian, 3; Soochow, 2; Swatow, 2; Taiyuanfu, 2; Tienchen, 2; Tientsin, 2; Tsinan, 2; Wanhsien, 2; Wuchang, 6; Wuchow, 4; Wuhu, 2; Yaan, 2; Yochow, 3; Yunnanfu, 2; Zikawei, 2; Zosé Observatory, 4	57	160
India	Alibag, 2; DehraDun, 2	2	4
Indo-China	Hanoi, 2; Hué, 2; Phantiet, 3; Pnompenh, 2; Phu Lien, 2; Saigon, 3; Siemreap, 2; Vinh, 2	8	18
Iraq	Bagdad, 2; Basra, 3	2	5
Japan	Kakioka Observatory, 2; Sugita, 2	2	4
Malaya	Singapore, 4	1	4
Persia (Iran)	Teheran, 2	1	2
Siberia (See Asiatic Russia)			
Turkish Empire, including Syria and Palestine	Afiumkarahissar, 2; Aidin, 2; Aleppo, 2; Alexandretta, 2; Beirut, 2; Damascus, 3; Dardanelles, 2; Homs, 2; Jerusalem, 2; Smyrna, 2	10	21
Thailand (Siam)	Hua Hin, 2; Bangkok, 2	2	4
	Totals for Asia	94	247
AUSTRALASIA			
Australia	Adelaide, 4; Albany, 4; Albury, 2; Alice Springs, 2; Ararat, 2; Ardrossan, 2; Augusta, 2; Balladonia, 3; Barrow Creek, 2; Batchelor, 3; Belair, 2; Blacktown, 12; Bordertown, 5; Bourke, 2; Brisbane, 5; Broken Hill, 3; Broome, 3; Bunbury, 5; Burra, 2; Cairns, 2; Camooweal, 3; Carnarvon, 4; Ceduna, 5; Charleville, 2; Clermont, 3; Cloncurry, 5; Connel's Creek, 3; Cooktown, 3; Coolgardie, 5; Cordillo Downs, 2; Cottesloe, 11; Croydon, 4; Cunnamulla, 2; Daly Waters, 2; Darwin, 4; Derby, 2; Dubbo, 2; East Maitland, 3; Edithburg, 3; Emerald, 2; Esperance, 2; Eucla, 5; Farina, 3; Flinders, 2; Forsayth, 2; Geraldton, 3; Goolwa, 2; Goondiwindi, 3; Goulburn, 2;		

Table 3. Repeat-localities and occupations for determination of magnetic secular-variation, 1905 to 1944--continued

Geographical divisions and subdivisions	Repeat-localities and occupations	Totals	
		Localities	Occupations
AUSTRALASIA--concluded			
Australia, concluded	Harden, 2; Hay, 2; Hobart, 3; Hughenden, 2; Jericho, 3; Katanning, 2; Katherine River, 3; Latrobe, 2; Lawlers, 2; Leonora, 2; Longford, 3; Longreach, 2; Mackay, 2; Maree (Hergott Springs), 3; Maryborough, 2; Meekatharra, 2; Melbourne, 7; Menindie, 2; Merredin, 4; Mildura, 2; Moora, 2; Moree, 3; Moruya, 2; Murray Bridge, 2; Nairne, 2; Narrogin, 2; Newcastle Waters, 2; Normantown, 2; Norseman, 4; Northam, 2; Oodnadatta, 3; Ooldea, 2; Perth, 4; Peterborough, 2; Pine Creek, 3; Point Charles Lighthouse, 2; Port Augusta, 5; Port Hedland, 3; Portland, 2; Port Lincoln, 3; Port Victor, 4; Red Hill, 8; Richmond, 2; Rockhampton, 4; Roma, 3; Rottnest Island, 2; Ryan's Well, 2; Sorell, 3; Southern Cross, 2; Southport, 2; Tambo, 3; Tarcoola, 2; Taylor's Crossing, 2; Tennant's Creek, 4; Tenterfield, 3; Thursday Island, 4; Toolangi, 2; Toowoomba, 2; Townsville, 4; Wagga Wagga, 2; Watheroo Observatory, 29; Wellington, 3; Werris Creek, 4; Wilcannia, 3; Winton, 2; Wongan Hills, 2; Woolgoolga, 3; Yalata Head, 4; Yorketown, 2; Yunta, 2	119	379
New Zealand	Amberley Observatory, 3; Auckland (Domain), 4; Awamutu, 2; Christchurch, 7; Clinton, 3; Eketahuna, 3; Kingston, 3; Mount Victoria, 2; New Brighton, 2; Queenstown, 3; Rotorua, 3; Roxburgh, 2	12	37
	Totals for Australasia	131	416
EUROPE			
Germany	Potsdam, 2	1	2
Great Britain	Eskdalemuir, 2; Falmouth, 2; Greenwich, 3; Kew, 7; St. Anthony, 2	5	16
Greece	Kephisia, 2	1	2
Italy	Palermo, 2; Rome, 2; Terracina, 3	3	7
Norway	Hop, 2	1	2
Russia (U. S. S. R.)	Batum, 2; Tiflis, 2	2	4
Spain	San Roque, 2	1	2
Turkey	Rumeli Hissar, 6	1	6
	Totals for Europe	15	41
NORTH AMERICA			
Alaska	College Observatory, 4; Point Barrow (1932-1933 Polar-Year Observatory), 2	2	6
Canada	Agincourt, 3; Ashe Inlet, 2; Bowdoin Harbor, 2; Cape Dorset, 2; Cumberland House, 2; Deer's Lake, 2; Englehart, 2; Fort William, 2; Lac Seul, 2; Long Falls, 2; Mattawa, 2; Missinaibie, 2; Mistassini, 2; New Liskeard, 2; North Bay, 4; Ottawa, 2; Pelican Narrows, 2; Pond Inlet, 2; Quebec, 2; St. John, 2; Sidney, 6; Winnipeg, 3	22	52
Central America	Acajutla, 2; Amapala, 2; Belize, 3; Bluefields, 2; Champerico, 2; Coban, 2; Colon, 14; Colon (Washington Hotel), 2; Corinto, 3; Corozal, 2; David, 2; El Cayo, 2; Flamenco Island, 2; Flores, 2; Granada, 3; Greytown, 2; Guatemala, 4; Huehuetenango, 2; Managua, 2; Old Panama, 4; Port Burchard (Casuna), 2; Prinzapolca, 2; Puerto Barrios, 3; Puerto Cortez, 2; Puntarenas, 2; Quezaltenango, 3; Salamá, 2; San José (Costa Rica), 6; San José (Guatemala), 4; San Marcos, 2; San Salvador, 2; Tegucigalpa, 2; Truxillo, 2; Uvita Island, 3; Zacapa, 3	35	99
Greenland	Etah, 5; Godhavn, 2; Godthaab, 3; Holstensborg, 3; Julianehaab, 2; Refuge Harbor, 2; Upernivik, 2	7	19
Mexico	Chihuahua, 2; Guaymas, 2; Hermosillo, 2; Monterey, 2; Nueva Casas Grandes, 2; Oaxaca, 2; Sabinas, 2	7	14

Table 3. Repeat-localities and occupations for determination of magnetic secular-variation, 1905 to 1944--continued

Geographical divisions and subdivisions	Repeat-localities and occupations	Totals	
		Localities	Occupations
NORTH AMERICA--concluded			
Newfoundland and Labrador	Battle Harbor, 7; Bay of Islands, 3; Gready, 2; Hopedale, 4; Nain, 2; Port Burwell, 3; St. John's, 4; West Turnavik, 2	8	27
United States	Baldwin, 4; Bronx Park, 2; Cheltenham, 13; Goat Island, 4; Greenport, 5; Miami, 3; New London, 2; Norfolk, 2; Presidio (San Francisco, Fort Scott), 3; San Diego, 5; San Rafael, 4; Washington, 26; Waycross, 3	13	76
	Totals for North America	94	293
SOUTH AMERICA			
Argentina	Bahia Blanca, 3; Cepolletti, 2; Colonia Las Heras, 3; Corrientes, 2; Dolavon, 2; Florida, 2; La Quiaca, 4; Las Flores, 2; Mendoza, 3; Mercedes, 4; Monte Caseros, 2; Pilar, 8; Puerto Deseado, 3; Puerto Madryn, 3; Santa Cruz, 4; Tucuman, 2; Victoria, 2; Zapala, 2	18	53
Bolivia	Guayaramerin, 4; La Paz, 8; Oruro, 2; Riberalta, 2; Uyuni, 4	5	20
Brazil	Abunã, 3; Alcobaça, 2; Almerim, 2; Araguari, 2; Bahia (Jaburu), 4; Barcellos, 4; Bella Vista, 2; Boa Vista, 2; Bocca do Jutahy, 2; Catalão, 3; Caracarahy, 2; Corumba, 3; Cucuhy, 2; Goyaz, 4; Guayara Merim, 2; Manaos, 4; Natal, 2; Obidos, 6; Pernambuco, 4; Pinheiro, 9; Porto Velho, 6; Registro, 2; Rio de Janeiro, 2; Rio Grande, 2; Santa Isabel, 3; Santarem, 5; Santos, 2; São Paulo de Olivença (Amazon 14), 2; Vassouras, 7	29	95
Chile	Antofagasta, 3; Arica, 5; Calama, 2; Concepcion, 2; Copiapo, 2; Coquimbo, 3; Coronel, 4; Corral, 2; Iquique, 3; Magallanes, 4; Puerto Montt, 4; Punta Arenas, 3; Santiago, 5; Ultima Esperanza, 2; Valparaiso, 5	15	49
Colombia	Bogota, 4; Buenaventura, 3; Calamar, 2; Cali, 2; Cartagena, 3; Honda, 2; Neiva, 2; Puerto Berrio, 3; Savanilla, 2; Tumaco, 2	10	25
Ecuador	Esmerladas, 2; Guayaquil, 5; Quito, 6; Riobamba, 3	4	16
Guiana	Bartica, 3; Cayenne, 4; Georgetown, 7; New Amsterdam, 3; Onverwacht, 2; Paramaribo, 4; Rockstone, 2; St. Laurent (Albina), 2; Wismar, 2	9	29
Paraguay	Concepcion, 2; Trinidad, 2	2	4
Peru	Arequipa, 7; Barranca, 2; Chilete, 2; Chimbote, 2; Huacho, 3; Huancayo, 2; Huancayo Observatory, 27; Ica, 2; Iquitos, 4; Juliaca, 7; La Merced, 2; Lima, 7; Masisea, 2; Matucana, 2; Mollendo, 6; Nauta, 2; Oroya, 2; Paita, 3; Pacasmayo, 2; Pisco, 2; Piura, 4; Puerto Bermudez, 2; San Lorenzo, 3; Tarma, 2; Tres Unidos, 2; Yurimaguas, 3	26	104
Uruguay	Colon, 5	1	5
Venezuela	Barcelona, 2; Barquismeto, 2; Caracas, 7; Carupano, 2; Ciudad Bolivar, 4; Comunidad, 2; Isla Pajaro, 2; La Ceiba, 2; La Urbana, 3; Maracaibo, 3; Puerto Cabello, 3; San Carlos, 2; San Fernando de Apure, 2; San Fernando de Atabapo, 2; Villa de Cura, 2; Zamuro, 2	16	42
	Totals for South America	135	442
ISLANDS, ATLANTIC OCEAN			
Bermuda	Agar's Island, 3; Ireland Island, 2; Nonsuch Island, 2; Spectacle Island, 3; St. George, 2	5	12
Canary	Las Palmas, 4; Santa Cruz, 5	2	9
Falkland	Port Stanley, 2	1	2
Iceland	Reykjavik, 2	1	2
Madeira	Funchal, 3	1	3
St. Helena	Longwood, 2	1	2
West Indies	Basse Terre, 2; Bathsheba, 2; Bridgetown, 7; Charlotte Amalie, 2; Christianstead, 2; Fort de France, 2; Havana, 7; Kingston, 7; Kingstown, 2; Matanzas, 3;		

Table 3. Repeat-localities and occupations for determination of magnetic secular-variation, 1905 to 1944--concluded

Geographical divisions and subdivisions	Repeat-localities and occupations	Totals	
		Localities	Occupations
ISLANDS, ATLANTIC OCEAN--concluded			
West Indies--concluded	Montego Bay, 2; Pinar del Rio, 3; Placetas del Norte, 2; Pointe à Pitre (La Jaille), 2; Port Castries, 2; Port of Spain, 6; Roseau, 2; San Fernando, 3; San Juan, 2; Santiago, 3; St. John's, 2; Vieques, 3; Willemstad, 2	23	70
	Totals for islands, Atlantic Ocean	34	100
ISLANDS, INDIAN OCEAN			
Ceylon	Colombo, 4	1	4
Java	Batavia, 3; Weltvreden, 3	2	6
Madagascar	Majunga, 2	1	2
Zanzibar	Zanzibar, 4	1	4
	Totals for islands, Indian Ocean	5	16
ISLANDS, MEDITERRANEAN			
Crete	Candia, 2	1	2
Cyprus	Larnaka, 2	1	2
Rhodes	Rhodes, 2	1	2
	Totals for islands, Mediterranean	3	6
ISLANDS, PACIFIC OCEAN			
Bismarck Archipelago	Rabaul, 3	1	3
Cook	Avarua, 3	1	3
Easter Island	Easter Island, 2	1	2
Ellice	Funafuti, 3; Nanomana, 2; Nanomea, 2; Niutao, 2; Nui, 2; Nukufetau, 2; Nukulailai, 2; Vaitupu, 2	8	17
Fanning	Fanning, 2	1	2
Fiji	Suva Vou, 7	1	7
Gilbert Islands	Nonuti Atoll, 2; Ocean Island, 2	2	4
Hawaii	Sisal (Honolulu Observatory), 7	1	7
Lord Howe	Lord Howe, 2	1	2
Marianas (Ladrone Islands)	Guam, 3	1	3
Marshall	Jaluit, 2	1	2
New Caledonia (including Loyalty Islands)	Bourail, 3; Lifu, 2; Maré, 2; Noumea, 3; Paagoumene, 2	5	12
New Guinea	Buna Bay, 2; Cape Nelson, 2; Ipoteto, 2; Mambare, 2; Port Moresby, 2; Samarai (Kwato), 3; Suau, 2	7	15
New Hebrides	Fila (Vila), 3; Luganville, 2	2	5
Samoa	Apia, 9; Pago Pago, 3; Tau, 2	3	14
Society Islands	Motu-Uta Island, 2; Papeete (Fareute Point, Small Coral Island), 8; Papeete (Tahiti Island), 2; Taravao, 2	4	14
Solomon Islands	Aola (Kumbara), 2; Binskins, 2; Faisi, 3; Gizo, 3; Makambo, 3; Salicana, 2; Tulagi, 2	7	17
Tokelau	Atafu, 2; Fakaofu, 2; Swains, 2	3	6
Tonga	Neiafu, 2; Nukualofa, 2	2	4
	Totals for islands, Pacific Ocean	52	139
ANTARCTICA			
Little America	Base, 2	1	2
Victoria Quadrant	Base, 2; Igloo, 2; Commonwealth Bay, 2	3	6
	Totals for Antarctica	4	8
	Grand total for all land work	736	2,116

Table 4. Regional distribution of secular-variation magnetic data obtained from 1927 to 1944, arranged according to arbitrary geographical divisions

Geographical division	Region or country		No. secular-variation localities
1	Alaska and Western Canada		7
2	Greenland	7	
	Iceland	1	8
3	Eastern Canada	17	
	Newfoundland and Labrador	8	25
4	Western United States		5
5	Eastern United States		8
6	Bermuda		5
7	Mexico		7
8	Central America	35	
	West Indies (West)	8	43
9	West Indies (East)		15
10	Colombia	10	
	Ecuador	4	
	Guiana	9	
	Venezuela	16	39
11	Bolivia	5	
	Brazil (West)	11	
	Peru	26	42
12	Brazil (East)		18
13	Argentina	18	
	Chile	15	
	Paraguay	2	
	Uruguay	1	36
14	Falkland Islands		1
15	Fanning Island	1	
	Hawaiian Islands	1	2
16	Cook Islands	1	
	Easter Island	1	
	Samoa Islands	3	
	Society Islands	4	
	Tokelau Islands	3	
	Tonga Islands	2	14
17	Cape Verde Islands		0
18	Canary Islands	2	
	Madeira Islands	1	3
19	Europe (West)		13
20	Europe (East), Batum and Tiflis		2
21	Mediterranean		3
22	Arabia	3	
	Asia Minor	10	
	Iraq	2	
	Persia (Iran)	1	16
23	Algeria	2	
	Algerian Sahara	1	
	Morocco	5	
	Tripolitania	1	
	Tunisia	2	11
24	Gambia	1	
	Gold Coast	3	
	Liberia	3	
	Sierra Leone	3	
	West Africa	22	32
25	Cameroun	3	
	French Equatorial Africa	10	
	Nigeria	9	22
26	Abyssinia	3	
	Egypt	4	
	Eritrea	2	
	Somaliland	1	
	Sudan	2	12
27	Angola	14	
	Belgian Congo	12	26
28	Kenya Colony	6	
	Tanganyika	4	
	Uganda	4	14
29	St. Helena Island		1
30	British South and Central Africa	34	
	Portuguese East Africa	8	
	Southwest Africa	10	52
31	Madagascar	1	
	Zanzibar	1	2
32	North Siberia		6
33	South Siberia		0
34	India		2
35	North China		16
36	Middle China		34
37	South China	7	
	Indo-China	8	
	Straits Settlements	1	
	Thailand (Siam)	2	18
38	Japan		2
39	Marianas	1	
	Marshall Islands	1	2
40	East Indies (Java)		2
41	Western Australia		27
42	Northern Territory		13
43	Queensland		29
44	South Australia	22	
	New South Wales	19	
	Victoria	4	
	Tasmania	5	50
45	Lord Howe Island	1	
	New Zealand	12	13
46	Bismarck Archipelago	1	
	Ellice Islands	8	
	Fiji Islands	1	
	Gilbert Islands	2	
	New Caledonia and Loyalty Islands	5	
	New Guinea	7	
	New Hebrides	2	
	Solomon Islands	7	33
47	Antarctica		4
48	Ceylon		1
	Grand total		736

DESCRIPTIONS OF INSTRUMENTS

MAGNETOMETERS

During the period 1927-1944, the Department of Terrestrial Magnetism used instruments of identical or similar design to those employed in making the measurements published in Volumes I to VI. Though many of these instruments had aged considerably through extensive use in the field by this Department and by others with whom it collaborated, rigid control of their constants was attempted. Necessary instrumental repairs were made as required from time to time. Occasional difficulties in the maintenance of constants arose in the case of a few instruments; in the case of others, the continued years of use and frequent intercomparisons of instruments facilitated the maintenance of trustworthy instrumental constants. Because of the somewhat reduced volume of land magnetic work undertaken from 1927 to 1944, it was possible to use only the more satisfactory of the field-instruments in this period with, it is believed, material advantage in accuracy. The instruments used were mainly of the light magnetometer-inductor design. Many years of service have shown these to give results considerably above expectation. In addition, a few of the measurements were made with good success with the la Cour quartz-fiber horizontal-force magnetometer (QHM) and the modified Schmidt field-balances, instruments of new and radically different design. The magnetometers of the Department are designated as follows:

1. The so-called theodolite-magnetometer type in three designs, viz., (a) and (b) of the Department of Terrestrial Magnetism, similar, respectively, to magnetometers Nos. 3 and 13, and (c) of the United States Coast and Geodetic Survey, similar to No. 20.
2. The Kew type of magnetometer in two designs, with auxiliar theodolites for astronomical work, viz., (a) the regular design as constructed by Elliott Brothers, similar to No. 73, and (b) the Magnetic Survey of India design, similar to No. 36.
3. The light and portable type used in the Magnetic Survey of France, similar to No. 11.
4. The universal-magnetometer type in three designs, viz., (a) the design of Eschenhagen, constructed and modified by Tesdorpf, similar to No. 2025; (b) the magnetometer dip-circle design of the Department of Terrestrial Magnetism, similar to Nos. 14, 19, 20, 21, and 22; (c) the magnetometer-inductor design of the same Department, similar to Nos. 23, 24, 25, 26, 27, and 28.
5. The QHM and Schmidt field-balances.

The first three types and design (a) of type 4 have been described in Volume I, pages 2 to 7; designs (b) and (c) of type 4 have been described in Volume II, pages 5 to 12. Instruments specially adapted for use by the Maud Arctic Expedition are described in Volume IV, page 8. Additional descriptions of some of these instruments are provided in Terrestrial Magnetism and Electricity, Physics of the Earth, Volume VIII, pages 59-109 (1939). The la Cour QHM is described in Publication No. 15, Publikationer det Danske Meteorologiske Institut (1936).

SINE-GALVANOMETER

In 1935, sine-galvanometer No. 1, designed by S. J. Barnett and constructed by the Department, was installed and given preliminary tests at the Cheltenham Magnetic Observatory of the United States Coast and Geodetic Survey, and in August of that year it was adopted as the standardizing instrument of the Coast and Geodetic Survey and the Department of Terrestrial Magnetism. The apparatus originally supplied with it for measurement of current was simplified prior to 1935, and the program of measurement was altered in order to shorten the time required for a determination of horizontal intensity.

The sine-galvanometer is described in detail and illustrated in Volume IV on pages 373 to 394, and the alterations in methods of use and in electrical equipment are given in the Transactions of the International Union of Geodesy and Geophysics for the Edinburgh meetings of 1936, pages 248 to 259 (1937).

DIP CIRCLES AND EARTH INDUCTORS

In the series of observations made from 1927 to 1944, earth inductors were used in preference to dip circles whenever possible, with consequent notable gains in accuracy. However, the limitations of the earth inductor, more marked in higher latitudes, are well known and keenly felt; definite need for further improvement in the methods of measuring inclination is recognized. Nevertheless, the use of this type of instrument for most of the measurements of the present volume is believed to have provided data on inclination considerably better than many of those given for this element in earlier volumes which were in most cases obtained with dip circles. Earth inductors of the Department are designated as follows:

1. The Wild-Eschenhagen design as represented by No. 48 constructed by Schulze, and No. 2 by Toepfer and Son.
2. Earth inductor made by the Department of Terrestrial Magnetism for inclination at sea, as represented by Nos. 3, 4, and 7; and earth-inductor attachment for universal magnetometer of type 4 (c).

The types of earth inductor mentioned in (2) are described in Volume I, pages 10 to 11, and in Volume II, pages 13 to 15. The Wild design is described in Inductions-Inclinatorium neuer construction und bestimmung der absoluten inclination mit demselben in Pawlowsk, St. Petersburg, Mem. Ac., series 7, 38, No. 3, 1891, by H. Wild. Descriptions of dip circles are given in Volume I, pages 7 to 10, and in Volume II, pages 7 to 12.

REDUCTIONS TO STANDARD INSTRUMENTS

MAGNETIC STANDARDS ADOPTED

As in earlier years, the Department continued its policy of making frequent intercomparison of instruments at magnetic observatories in various parts of the world. Early work had demonstrated that at least a good approximation to satisfactory international standards was afforded by the provisional "International Magnetic Standards" of the Department. Accordingly, the use of the provisional standards was continued in computing results for the present volume. Direct and indirect intercomparisions with magnetometers and inductors, with the QHM magnetometers of la Cour, and with the sine-galvanometer, have confirmed the findings of earlier years that the provisional standards retain values in close correspondence with the mean values of the standard instruments of many observatories.

The standards adopted from January, 1926, to July, 1935, were: CIW magnetometer No. 3 with correction on I. M. S. of -0′.1 to observed values of declination, and zero correction to observed values at horizontal intensity; earth inductor No. 48 by Schulze for inclination, with zero correction on I. M. S. Standardization observations with these instruments were made in the Standardizing Magnetic Observatory (SMO) of the Department until July, 1935.

From August, 1935, standardization work was done at the Cheltenham Magnetic Observatory of the United States Coast and Geodetic Survey. The Coast and Geodetic Survey magnetometer No. 37 was used for the declination standard, with the correction to observed values on I. M. S. taken as -1′.0. Sine-galvanometer No. 1 was adopted as the standardizing instrument for horizontal intensity, with a correction to observed values of -0.00018H. Both of these instruments were still being used as standards at the end of 1944. For inclination, the standard Schulze No. 48 earth inductor was moved from the SMO at Washington to Cheltenham in 1936 where it has been used regularly since that time, except for a short period in 1941 when it was undergoing repairs. For inductor No. 48, the correction to observed values on I. M. S. was taken as zero.

MAGNETOMETER CORRECTIONS

The corrections of each field magnetometer to the adopted standards were determined from intercomparisons made at the Standardizing Magnetic Observatory in Washington or at Cheltenham Observatory, both before and after use of the instruments in the field. The accuracy of the mean correction generally has been within about 0′.2 in declination, and about 0.0001H in horizontal intensity.

It has been found that a principal source of change in constants of a magnetometer is in the more or less gradual change with time in the moment of inertia of the magnet-system used in oscillations, owing to wear and even to the chemical action on this system resulting from exposure and subsequent tarnish. Long series of intercomparisons have shown that these changes are probably linear on the whole, though perhaps sometimes consisting of very small sudden changes at irregular intervals not revealed individually by the intercomparisons. The distribution coefficients of the magnetometers also vary and contribute to changes in the correction to standard. Table 5 gives the corrections and adopted constants for magnetometers for the period 1927 to 1944. The tabulated corrections are applied algebraically, east declination and horizontal intensity being reckoned as positive.

INCLINOMETER CORRECTIONS

For discussion of corrections for dip circles and earth inductors, reference may be made to Volume VI, pages 20 to 22. Table 6 lists the adopted corrections for inclinometers, of both types.

METHODS OF OBSERVATION

The methods of observation and computation used for the results of the present volume conform closely with those described in Volumes I, II, IV, and VI, where examples of observations and computations are included.

Three classes of stations have been used by the Department. The stations of Class I are usually conveniently accessible stations, spaced at intervals of 500 to 800 miles, at which observations of diurnal variation are made through the daylight hours, at about 20-minute intervals. Class II stations are those located at points intermediate between Class I stations and are usually about 200 miles apart. At these stations observations are made on two successive days, thereby reducing the chance that the observations will be seriously affected by magnetic disturbances. At Class I and Class II localities additional stations, designated Class III, similar to those first chosen in so far as the general program of observation is concerned, are occupied in order to preserve the site for future repeat observations for noting secular change, and also to assist in detecting local disturbance. At Class III stations a program of observation is carried out in the manner customary for repeat-stations.

Table 5. Magnetometer corrections on adopted I. M. S. for the period 1927 to 1944

No. of magnetometer	Corrections to be observed		Constants of	Period		Remarks
	Declination	Horizontal intensity		From	To	
	′					
3	- 0.1	0.00000H.	Dec 12, 1910	1927.0	1935.58	Standard instrument at Washington, D.C., since 1910
6	+ 0.8	+0.00014H+(1927-t) 0.00077H.	Jun 29, 1911	....	....	To Government Observatory, South Australia, July 23, 1914
7	- 0.2	-0.00074H+(1926-t) 0.0000517H.	May 24, 1916	1927.0	1945.0	Used as standard since 1918 at the Watheroo Magnetic Observatory, Western Australia
9	- 0.2	-0.00079H.	Nov 21, 1934	....	....	To Apia Observatory, Samoa, 1935
10	- 0.5	+0.00032H+(1920-t) 0.000027H.	Sep 23, 1916	1927.0	1945.0	Used as standard since 1919 at the Huancayo Magnetic Observatory, Peru
12	- 0.2	-0.00164H.	Apr 11, 1928	1928.33	1929.88	Used on Carnegie Cruise VII; lost with ship
13	- 0.5	-0.00006H+(1927.78-t) 0.000083H	Oct 31, 1927	1927.78	1931.58	
13	- 0.2	-0.00013H+(1931.76-t) 0.00102H.	Aug 1, 1931	1931.76	1936.84	
16	- 0.3	+0.00024H.	May 1, 1929	1929.3	1931.5	
16	- 0.3	+0.00017H+(1931.6-t) 0.00052H.	May 1, 1929	1931.6	1933.15	
16	- 0.3	-0.00064H+(1933.15-t) 0.00024H.	May 1, 1929	1933.15	1933.88	
16	- 0.2	-0.00016H+(1933.88-t) 0.00024H.	Dec 14, 1933	1933.88	1934.66	Extended to cover observations in Africa in 1934 up to time of accident to instrument
16	- 0.2	+0.00116H.	May 15, 1941	1941.25	1941.90	Deflection distances 20, 25, and 28 cms
16	- 0.2	+0.00152H.	May 15, 1941	1941.25	1941.90	Deflection distances 30, 33, and 35 cms
16	0.0	+0.00002H.	Jul 1, 1943	1943.45	1943.88	
17	- 0.2	+0.00018H+(1926.0-t) 0.00013H.	Jun 15, 1922	1926.0	1932.5	
17	- 0.1	-0.00001H+(1932.58-t) 0.00020H.	Aug 1, 1932	1932.58	1934.45	
18	- 0.6	+0.00014H+(1930.36-t) 0.00014H.	Jun 1, 1930	1930.36	1935.60	
21	- 0.1	-0.00004H+(1933.65-t) 0.00031H.	Sep 20, 1933	1933.65	1935.48	
24	- 0.4	-0.00033H.	Apr 13, 1928	1928.33	1929.88	Used on Carnegie Cruise VII; lost with ship
25	- 0.3	+0.00015H+(1922.28-t) 0.00011H.	Jan 15, 1922	1922.28	1929.36	
25	- 0.5	+0.00028H+(1929.36-t) 0.000023H	Jun 22, 1929	1929.36	1941.28	
26	0.0	-0.00032H+(1925.28-t) 0.00015H.	Jun 7, 1924	1925.28	1928.36	
26	0.0	-0.00079H+(1928.36-t) 0.00003H.	Jun 7, 1924	1928.36	1931.4	
26	- 0.2	-0.00004H+(1931.4-t) 0.00003H.	Jul 31, 1931	1931.4	1932.6	
26	- 0.2	-0.00042H+(1932.6-t) 0.00050H.	Nov 15, 1932	1932.6	1933.76	
27	- 0.4	-0.00009H+(1938.86-t) 0.00023H.	Jan 1, 1939	1938.86	1941.04	
28	+ 0.2	-0.00046H+(1935.85-t) 0.00027H.	Dec 30, 1935	1935.85	1944.96	
143	- 1.7	-0.0013H	Jul 29, 1926	....	....	U. S. Navy magnetometer
150	- 0.5	+0.00019H.	Jun 3, 1905	....	....	U. S. Navy magnetometer
156	0.0	-0.00147H.	May 15, 1926	....	....	U. S. Navy magnetometer
QHM42	....	+0.00009H.	Sep 3, 1938	....	....	
QHM43	....	-0.00012H.	Sep 3, 1938	....	....	
QHM44	....	-0.00001H.	Sep 3, 1938	....	....	
OS-11	+ 0.3	+0.00009H.	Jul 31, 1936	....	....	
BT3578	-17.5	....	Nov 12, 1931	....	....	Berger theodolite used on various north and south polar expeditions, 1933-1943
SG-1	....	-0.00018H.	Mar 31, 1936	1935.58	1945.0	Permanently installed at Cheltenham Observatory since August, 1935, as standardizing instrument

Table 6. Inclinometer corrections on adopted International Magnetic Standards for the period 1927 to 1944

Instrument	Type[a]	Tabular designation	Corrections for compass	Corrections for needle		Remarks
21	Universal	21.1236	′	No. 1 No. 2 No. 3 of 19 No. 6 of 20	′ -0.6 -0.3 +0.1 0.0	Used on Cruise VII of Carnegie.
125	U.S. Navy	125.45	......	....	......	Needle corrections unknown.
127	U.S. Navy	127.12	......	No. 1 No. 2	-1.0 -0.8	
Dover circle 222. .	(a)	222.1256	+5.4	No. 1 No. 2 No. 5 No. 6	-0.3 0.0 -0.1 +0.2	Used on Byrd Antarctic Expedition II, 1933-1935. The corrections for inclinations from needle 7 deflected by needle 8 of 177 and from needle 7 deflected by needle 8 of 178 were: +2'.2 and -1'.4. The logarithms of total-intensity constants for needle-pairs 7 and 8 of 177, and 7 and 8 of 178 were: 9.63948 and 9.64010.
Dover circle 222. .	(a)	222.1256	+6.8	No. 1 No. 2 No. 5 No. 6	-0.3 -0.1 -0.3 -0.4	Used on McGregor Arctic Expedition, 1937. The corrections for inclinations from needle 7 deflected by needle 8 of 177, and from needle 7 deflected by needle 8 of 178 were: +2'.8 and -3'.0. The logarithms of total-intensity constants for needle-pairs 7 and 8 of 177, and 7 and 8 of 178 were: 9.59106 and 9.58612.
Dover circle 222. .	(a)	222.127X8X	+8.5	No. 1 No. 2 No. 7X No. 8X	-0.8 -0.5 -1.1 -1.1	Used on Boyd Expedition, 1941. The corrections for inclinations from needle 5 of 172 deflected by needle 4 of 177 and from needle 7 deflected by needle 8 of 178 were: -7'.9 and -6'.3. The logarithms of total-intensity constants for needle-pairs 5 of 172 and 4 of 177, and 7 and 8 of 178 were: 9.49370 and 9.58564.
Dover circle 226. .	(a)	226.12	......	No. 1 No. 2	-1.6 -2.0	Corrections determined by comparisons with earth inductor No. 28, April 2-6, 1936. Loaned to University of South Australia at Adelaide, Australia.
Dover circle 241. .	(a)	241.1256	-5.8	No. 1 No. 2 No. 5 No. 6	+0.1 +0.2 +0.8 +0.5	Used on Byrd Antarctic Expedition II, 1933-1935. The corrections for inclinations from needle 3 deflected by needle 4, and from needle 7 deflected by needle 8 were: +1'.1 and -9'.2. The logarithms of the total-intensity constants for needle-pairs 3 and 4, and 7 and 8 were: 9.58985 and 9.59186.
Dover circle 241. .	(a)	241.12	+6.7	No. 1 No. 2	-0.8 -0.5	Used on United States Antarctic Expedition, 1940-1941.
Dover circle 242. .	(a)	242.1256	-3.3	No. 1 No. 2 of 240 No. 5 No. 6	+0.2 +0.4 0.0 0.0	Used on Byrd Antarctic Expedition I, 1928-1930. The corrections for inclinations from needle 3 deflected by needle 4 of 202, and from needle 1 of 172 deflected by needle 8 of 202 were: +5'.2 and -2'.8. The logarithms of total-intensity constants for needle-pairs 3 and 4 of 202, and 1 of 172 and 8 of 202 were: 9.57198 and 9.56984.

Table 6. Inclinometer corrections on adopted International Magnetic Standards for the period 1927 to 1944--continued

Instrument	Type^{a}	Tabular designation	Corrections for compass	Corrections for needle		Remarks
					′	
Dover circle 242. .	(a)	242.56	- 0.4	No. 5 No. 6	- 1.3 + 0.2	Used on Wilkins-Ellsworth Trans-Arctic submarine expedition of 1931. The correction for inclination from needle 3 deflected by needle 4 of 202 was: +4′.6. The logarithm of the total-intensity constant for needle-pair 3 and 4 of 202 was: 9.56043.
Dover circle 242. .	(a)	242.1256	+ 0.3	No. 1 No. 2 of 240 No. 5 No. 6	+ 2.2 - 0.2 - 2.2 + 1.2	Used in Polar Year work at Point Barrow, 1932-1933. The corrections for inclinations from needle 3 deflected by needle 4 of 202, and from needle 1 of 172 deflected by 8 of 202 were: +5′.0 and -3′.3. Logarithms of total-intensity constants for needle-pairs 3 and 4 of 202 and 1 of 172 and 8 of 202 were: 9.52888 and 9.57056.
Dover circle 242. .	(a)	242.1256	- 2.5	No. 1 No. 2 of 240 No. 5 No. 6	+ 1.4 0.0 - 1.5 + 1.1	Used on McGregor Arctic Expedition, 1937-1938. The corrections for inclinations from needle 3 deflected by needle 4 of 202, and from needle 1 of 172 deflected by 8 of 202 were: +6′.2 and -4′.1. Logarithms of total-intensity constants for needle-pairs 3 and 4 of 202, and for 1 of 172 and 8 of 202 were: 9.52977 and 9.57044.
Dover circle 242. .	(a)	242.1256	+ 3.6	No. 1 No. 2 of 240 No. 5 No. 6	+ 4.0 - 0.1 - 1.6 + 0.8	Used by United States Coast and Geodetic Survey on United States Antarctic Expedition, 1940-1941.
Earth inductor 2 . .	...^{b}	EI 2	......		0.0	Used as standard since 1918 at the Watheroo Magnetic Observatory, Australia.
Earth inductor 2 . .	...^{c}	EI 2	......		- 0.2	Schulze type. Property of Apia Observatory, Samoa.
Earth inductor 5 . .	...^{b}	EI 5	......		0.0	Used as standard since 1919 at the Huancayo Magnetic Observatory, Peru.
Earth inductor 6A .	...^{c}	EI 6	......		......	
Earth inductor 7 . .	...^{d}	EI 7	......		......	Used on Carnegie Cruise VII. Lost with ship.
Earth inductor 12 .	...^{d}	EI 12	......		- 0.3	
Earth inductor 13 .	4^{d}	EI 13	......		+ 0.4	July 1 to October 31, 1927.
Earth inductor 13 .	4^{d}	EI 13	......		- 0.3	November 1, 1927, to August 1, 1931.
Earth inductor 13 .	4^{d}	EI 13	......		- 1.0	November 12, 1931, to July 18, 1932.
Earth inductor 13 .	4^{d}	EI 13	......		- 0.1	July 19, 1932, to April 14, 1933.
Earth inductor 13 .	4^{d}	EI 13	......		- 0.5^{e}	April 15, 1933, to October 7, 1933.

Table 6. Inclinometer corrections on adopted International Magnetic Standards for the period 1927 to 1944--concluded

Instrument	Type[a]	Tabular designation	Corrections for compass	Corrections for needle	Remarks
			′	′	
Earth inductor 13 .	4[d]	EI 13	......	+0.7[e]	October 8, 1933, to January 27, 1934.
Earth inductor 13 .	4[d]	EI 13	......	+1.2[e]	January 28, 1934, to August 30, 1934.
Earth inductor 13 .	4[d]	EI 13	......	+0.3	August 31, 1934, to July 23, 1936.
Earth inductor 16 .	4[d]	EI 16	......	0.0	May 1, 1929, to June 1, 1931.
Earth inductor 16 .	4[d]	EI 16	......	-0.1	June 2, 1931, to November 30, 1933.
Earth inductor 16 .	4[d]	EI 16	......	-0.2	December 1, 1933, to May 15, 1941.
Earth inductor 16 .	4[d]	EI 16	......	-0.5	May 16, 1941, through 1943. Used in Greenland, Labrador, and Newfoundland.
Earth inductor 17 .	4[d]	EI 17	......	+0.4	January, 1927, to July, 1932.
Earth inductor 18 .	4[d]	EI 18	......	+0.2	January, 1927, through 1940. (British East Africa Meteorological Service)
Earth inductor 18 .	4[d]	EI 18	......	+0.3	January, 1941, through 1943.
Earth inductor 24 .	4[d]	EI 24	......	I.M.S. - $2Y = 0'.26 - 1.832(t-1928.0)$	Used at shore stations on Carnegie Cruise VII.
Earth inductor 25 .	4[d]	EI 25	......	+0.1	January, 1927, through July, 1929.
Earth inductor 25 .	4[d]	EI 25	......	-0.1	May 1, 1941.
Earth inductor 26 .	4[d]	EI 26	......	-0.2	During entire epoch.
Earth inductor 27 .	4[d]	EI 27	......	-0.4	From December, 1938.
Earth inductor 28 .	4[d]	EI 28	......	-1.8	January 1, 1936, through 1941.
Earth inductor 48[f].	...[c]	EI 48	......	0.0	Standard instrument of the Department since 1907.
Earth inductor 171		EI 171	......	+0.3	January, 1932, to February 17, 1934.
Earth inductor 171		EI 171	......	-2.4	February 18, 1934, to December 7, 1934.

[a] For explanation of types, see p. 9.
[b] Wild-Eschenhagen type, as made by Toepfer and Son, with Department modifications.
[c] Wild-Eschenhagen type, as made by Schulze.
[d] Marine type, made by Department of Terrestrial Magnetism.
[e] To be applied to mean of values for rotation coupling up, and down, to February 17, 1934.
[f] Designated by maker's number. This instrument is serial No. 1 of the Department.

OBSERVERS' FIELD REPORTS

The following reports, or extracts of reports, for the years 1927-1944 give information useful to organizations planning similar expeditions. They also furnish some indication of the conditions under which magnetic observations were made in the field.

Detailed particulars regarding the stations will be found in the section of this volume entitled "Descriptions of Stations," where the arrangement is alphabetical according to country in each of the main geographical divisions, also alphabetically arranged. The magnetic data are given in the table of results in which the arrangement of the main divisions and the countries or subdivisions under them is the same as that employed for the descriptions of stations, but in which the stations are arranged according to latitude.

The arrangement adopted for the observers' reports is alphabetical under the names of the observers. In order that the itinerary of the observer may be more readily traced, the names of the stations in the lists appended to each report are given in chronological order.

E. H. BRAMHALL, ON MAGNETIC WORK IN ANTARCTICA, OCTOBER TO DECEMBER, 1934

The plateau party had initially for its objective the South Polar Plateau. Starting from Little America on October 16, 1934, it was to spend about 90 days in the field taking magnetic and seismic observations en route to and from the plateau. Its personnel was Charles G. Morgan, co-leader and geophysicist; E. H. Bramhall, co-leader and navigator in charge of magnetic work; Fain Ronne and Albert Eilepson, ski experts and ice craftsmen.

As far as the 175-mile depot, the plateau party was accompanied by the geological party. At that point it was found impossible for the Citroen tractors, which were to act as support, carrying dog food and supplies as well as Morgan's equipment, to proceed through the extensive crevassed area confronting us.

Upon our communicating with Little America, Admiral Byrd and Dr. T. C. Poulter, second in command, decided that Morgan and myself should continue with the tractors, working to the east or southeast, while Ronne and Eilepson should act as support for the geological party. Henceforth our party consisted of Morgan and myself, co-leaders; Demas and Hill, drivers and mechanics; and Waite, radio operator.

After trying to force our way through the crevasses in several places towards the south, we found it necessary to retreat and turn to the east. In this direction, we reached the 149th meridian near the 81st parallel before turning northward towards the recently discovered eastern plateau.

Station PP1A.--October 12, 1934. Bramhall and Eilepson left Little America by dog-team at 11h and followed the south trail to the advance base 9.5 miles south of Little America. The principal purpose of the trip was to forward some of the load of the plateau party. We took compass dipcircle No. 241 and secured one set of declination with the compass attachment, returning to Little America early next morning.

PP1.--October 16. The entire party, accompanied by the geological party, left Little America with two tractors and several dog-teams. At latitude 79°.5 S and longitude 163°.3 W, by dead reckoning, we camped for the night. Next morning Bramhall and Eilepson remained to establish a magnetic station, rejoining the others at their camp 17 miles ahead. Values of declination, inclination, and longitude were obtained.

PP2.--October 24, 25. We arrived at the Bolling Advance Weather Base, about 100 miles south of Little America, on the evening of October 23. Magnetic and solar observations were made on October 24 and 25, obtaining a complete set, declination (D), inclination (I), total intensity (F), latitude (ϕ), and longitude and azimuth (λ). At this station Dr. Poulter had established during the winter a meridian line marked by two bamboo poles 500 feet apart. The magnetic station was located exactly on the line between the poles and 139 feet from the north pole.

PP3.--October 30. We stopped three miles southeast of the 150-mile beacon where observations were made and values of D, I, ϕ, and λ were obtained. The beacon was eight feet high and four feet in circumference at the top, with a tall flag set in the center. The sky was clear, but a cold wind from the northwest made observing difficult.

PP4.--November 4, 5. While some members of the party were reconnoitering for a tractor trail over the crevasses ahead, a complete set of observations was made. Weather conditions were relatively favorable, clear sky and little wind. At this point the party divided, the plateau party going eastward with tractors because of the crevasses, and the geological party going south with dogs.

PP5A.--November 10. An advance of 15.7 miles eastward brought us to another crevassed area. During the enforced delay an approximate value of declination was obtained with the Berger theodolite.

PP5B.--November 11, 12. This station was near PP5. Values of D, approximate ϕ, and λ were secured with the theodolite on November 12.

PP5.--November 13-16. Delayed here four days by large crevasses. After having penetrated six miles into the area, one of the tractors broke through a crevasse about six feet wide and several hundred feet deep. Four hours of digging were required to rescue it. During the delay a complete set of magnetic and solar observations was obtained.

PP6.--November 19, 20. Tractors held up two days for repairs. A complete set of observations was obtained. Weather conditions were quite favorable.

PP7.--November 22. We stopped for Morgan's seismic work and to establish a magnetic station. A complete set of observations was made. It was an excellent day for work outdoors, temperature rising to 0° C.

PP8.--November 23, 24. We stopped for magnetic and seismic work. A complete set of observations was obtained. Weather conditions were fair, highest temperature -6° C, wind north force 3. The elevation at this

Table 7

No.	Station	Date	Latitude	Longitude East
		1934	° ′	° ′
1	PP1A, Ross Ice Shelf	Oct 12	78 43.6 S	196 04
2	PP1, Little America	Oct 22	79 29.1 S	196 41
3	PP2, Bolling Advance Base, Little America	Oct 24, 25	80 06.9 S	196 06
4	PP3, Little America	Oct 30	80 51.9 S	198 11
5	PP4, Carmen Land	Nov 4, 5	81 09.6 S	198 55
6	PP5, Ross Dependency	Nov 15, 16	81 06.3 S	202 32
7	PP6, Ross Dependency	Nov 19	80 37.5 S	202 48
8	PP7, Ross Dependency	Nov 22	80 29.4 S	208 27
9	PP8, Ross Dependency	Nov 23, 24	80 27.0 S	210 56
10	PP9, Ross Dependency	Nov 27-29	79 39.0 S	210 27
11	PP10, Marie Byrd Land	Dec 3, 4	79 16.7 S	211 00
12	PP11, Marie Byrd Land	Dec 10	79 00.7 S	209 36
13	PP12, Marie Byrd Land	Dec 12, 13	78 48.8 S	209 27
14	PP13, Marie Byrd Land	Dec 14	78 33.6 S	209 30
15	PP14, Marie Byrd Land	Dec 16, 17	78 23.1 S	207 47
16	PP15, Marie Byrd Land	Dec 19-28	78 26.5 S	206 39
17	PP16A, King Edward VII Land	Dec 29, 30	78 27 S	205 29
18	PP16, King Edward VII Land	Dec 30	78 23.2 S	204 10
		1935		
19	PP17, Ross Ice Shelf	Jan 1	78 34.5 S	200 04

point is 560 feet. The station was about five miles east of a considerable rise, about 200 feet according to barometer, and was thought to be on the edge of a plateau rising northward to about 2,400 feet.

About 22h, November 23, Admiral Byrd, June, Bowlin, Parsons, and Peterson arrived in the plane bringing parts for the tractors. I took a short flight ahead, about 200 miles, to examine the crevassed area for a passage on to the plateau. There seemed to be a favorable opening about 30 miles northeast of us, and later we shall try to negotiate this passage, heading north towards Mount Grace McKinley.

PP9.--November 27-29. We stopped to establish a magnetic station. Weather conditions were ideal, temperature going slightly above freezing in the afternoon with a light wind. It was possible to work with bare hands for the first time. A complete set of solar and magnetic observations was obtained.

PP10.--December 3, 4. About 25 miles from PP9 on course 15° true (N by E) at an elevation of 1,850 feet or more than 1,200 feet above PP9, undoubtedly on land. A complete set of observations was made under ideal conditions. We worked with bare hands most of the time.

PP10A.--December 6. About 11 miles from PP10 on course 335° (NNW). While stopped by a crevassed area, I secured two approximate sets of D and values for azimuth and longitude with the Berger theodolite.

PP11.--December 10. During an enforced stop because of crevasses ahead, I obtained a complete set of solar and magnetic observations. Northwest of us was a steep hill probably several hundred feet above our present level of about 950 feet. Between us and this hill was a dangerously crevassed area which we were going to try to cross by probing our way carefully. Snow surface was very soft. Conditions were ideal for observing, temperature reaching 9° above zero centigrade.

PP12.--December 12, 13. After being forced to abandon one tractor at latitude 79°.0, longitude 150°.5 W, because of broken piston rod and crankcase, we advanced through a low crevassed area to the west, and then started climbing over a series of hills and terraces, camping about 15 miles from our starting point. The elevation here is about 2,000 feet and undoubtedly there is land beneath. While Morgan took soundings to determine the depth of snow I established a magnetic station, securing values for D, I, F, and λ. Weather conditions were moderately good except towards the last when a cold north wind of force 2 became unpleasant.

PP13.--December 14. We arrived here after covering 15 miles from our last camp. I took advantage of the fine weather to start magnetic observations immediately. I finished D, I, F, and ϕ before a dense fog set in. The altitude is 1,000 feet higher than our last station; elevation is about 3,040 feet. The surface was very hard and dotted with high sastrugi. The fog began to clear early in the morning of December 15 and I was able to make observations for azimuth and longitude. Morgan secured a comprehensive series of soundings.

PP14.--December 16, 17. This station was at the 150-mile depot of the eastern trail from Little America and was the first station where land was visible. About 30 miles to the northwest the peaks of the Rockefeller Mountains could be seen, appearing like small haycocks. From each end of a 2,000-foot baseline extending northeast to southwest, a round of horizontal and vertical angles was taken on all of the ten visible peaks. I also obtained a complete set of solar and magnetic observations. Conditions were excellent, warm weather and only light wind.

PP15.--December 19-28. Fifteen miles west of the 150-mile depot a vital part of our tractor succumbed and before proceeding it was necessary to await reinforcement by dog-team from Little America. In the meantime I secured a complete set of magnetic observations with each of dip circles No. 222 and No. 241. The weather during most of this period was hardly tolerable because of a two-day blizzard from the east and the sky was entirely overcast during the remainder of the time. The dip-circle observations were taken on December 26, and the solar observations when opportunity offered. On December 27 Ronne and Black arrived with the tractor parts. December 28 was the first clear day and I took advantage of the excellent visibility to secure a round of azimuths on the prominent peaks of the Rockefellers visible to the north-northwest. This should establish positions fairly accurately when combined with the sights from station PP14.

PP16A.--December 29, 30. At the 120-mile beacon we stopped to make a survey of the Rockefellers and for seismic soundings. Opportunity was taken also to make D, I, ϕ, and λ observations. Conditions were fair; the sky became overcast about midnight of December 29 with a chilly east wind.

PP16.--December 30. At the 102-mile point on the eastern trail. I again made a round of angles on the Rockefellers and obtained a complete series of solar and magnetic observations. Morgan left our party here to make an excursion to the mountains with Ronne and Black, while Demas, Hill, Waite, and I proceeded to Little America. Conditions were excellent for outside work, although the soft surface necessitated the use of long stakes for mounting the tripod.

PP17.--December 31, January 1, 1935. The tractor party, consisting of Pete Demas, Joe Hill, Bud Waite, and myself, camped 50 miles from Little America on the afternoon of December 31 to establish the last magnetic station before returning to the base. I obtained a complete series of observations on the morning of January 1, and we started for Little America at noon, arriving there at 16h in a dense fog.

F. C. BROWN, ON MAGNETIC WORK IN CHINA, NOVEMBER, 1931, TO JULY, 1936

Observations were made during a few months of each year while I was on furlough from missionary work. Additional measurements were made by the writer's colleague, Dr. Paul C. T. Kwei, whose report is given separately in this volume.

The instruments usually used were CIW theodolite-magnetometer No. 13, with galvanometer No. 35X; Ditisheim chronometer No. 50100; and two pocket watches, Elgin 115 and Howard 820.

Table 8 lists the stations occupied by the writer during 1931 to 1936.

On being granted ten days' leave by the Bishop, I traveled by plane from Hankow to Shanghai on November 10, 1931, and took delivery of instruments and tent from Dr. Ting, of the National Physics Research Laboratory. The next morning I proceeded by rail and boat to Lukiapang Observatory. Here Mr. Yang, secretary of the National Physics Laboratory, familiarized himself with the use of our instruments, and intercomparisons were made with the observatory standards. The tenth day was spent at Wuchang in instructing Dr. Paul C. T. Kwei in the use of the instruments. I then hurried back from Shanghai, fearing there would be war with Japan and student rioting. Since a Chinese army later attacked a walled city only 20 miles away, apprehension was felt for our safety and that of the instruments. There were also a quarter of a million flood refugees in camps on the outskirts of Wuhan who might have become a menace should the distribution of food have been discontinued.

The trip to Changsha was fairly successful, although bad weather was experienced, almost continuous rain being expected in this region from January to June. However, the Sun was observed through a small rift in the clouds during reoccupation of the 1907 station.

I next left Hankow on July 4, 1932, traveling by rail to Chengchow, and occupied this magnetic station with Dr. Kwei the next day. After travel by train and motor car, I reached Sian on July 7, reoccupied the station with Dr. Kwei, and visited a Baptist mission three miles distant for the purpose of establishing a secondary mission there. I also gave Dr. Kwei further instruction in the use of the instruments. On July 10 I called on the postal commissioner to secure permission to make the return journey by postal lorry, since all traffic was stopped because of plague. The next day I proceeded by postal lorry to Tungkwan and reached Hankow by rail on July 14.

The observations in August, 1932, at Peiping, Kalgan, and Tienchen were carried out without incident.

I reoccupied the Peiping magnetic station (established in 1916) on September 13, reached Shihkiachwang on September 6, where I reoccupied Dr. Kwei's station, and established a new secondary station. I then left for Hankow on September 7.

On a few days in November and December, 1932, and January and March, 1933, observations of the daily variations in D, H, and I were made at Wuchang.

Further work was carried out as opportunity afforded from July 1, 1933, to June 30, 1934. The first summer's program consisted of the reoccupation of a line of CIW magnetic stations extending from Hankow in Central China, along the Yangtze River to Suifu, and thence northwards to Chengtu in West China.

Dr. Paul C. T. Kwei of Central China College traveled by steamer direct from Hankow to Chungking, intending to proceed overland to Chengtu, but he was unable to do so because of the outbreak of civil war in the province of Szechwan. He accordingly made observations at five points on the river between Chungking and Ichang.

At the end of July, 1933, I moved up to Ichang making it a base for a summer vacation. If the fighting should stop, I hoped to proceed up the river to Chungking and undertake the remainder of the work. The road between Chungking and Chengtu opened at the end of August, but it seemed that points beyond and to the west were still involved in military operations; therefore, this part of the project was abandoned. On the way back to Hankow, measurements were made at Ichang, Shasi, and Yochow.

From September, 1933, to February, 1934, a few observations of the daily variations of D, H, and I were made monthly on the campus of the Hua Chung College.

From September 15 to November 26, 1934, a survey was made in West China. I took the Chungking steamer on September 16, reaching and observing at Ichang on September 19. I then passed through Chungking, arriving at Chengtu after five days by boat. Here I made observations and called on various officials, proceeding by bus and rickshaw to Kiungchow, where I joined a caravan. The next 30 miles were covered with carriers. The roads were a quagmire, and my baggage carriers did not arrive in time for me to catch the stage. On October 8 I saw General Hsiang to secure a passport. I completed my observations, continued by carriers, and made observations at Hwangnipu, proceeding thence to Nitow, and over the Tei Yueh Ling Pass. I then made observations at Luting, Kangting (Tatsienlu), and waited for horses for the trip to the Tibetan grasslands. I passed over the Cheto Pass (15,400 feet) on October 24, arriving at Yinkwanchai the next day and observing at a new station at Mosimien at the end of the month.

The first two days of the return journey from the

Table 8

No.	Station	Date	Latitude		Longitude East	
		1931	°	′	°	′
1	Lukiapang, Kiangsu	Nov 11-14	31	19.0 N	121	02
2	Wuchang, Hupeh	Nov 21, Dec 5	30	33.7 N	114	20
		1932				
3	Wuchang, Hupeh	Jan 9	30	33.7 N	114	20
4	Hankow, Hupeh	Feb 16, 19, 20	30	37.0 N	114	18
5	Changsha, A, Hunan	Apr 7	28	12.8 N	112	58
6	Changsha, B, Hunan	Apr 9	28	13.3 N	112	58
7	Changsha, C, Hunan	Apr 10, 11	28	13.3 N	112	58
8	Peiping (Peking 1907), Hopei	Aug 22, 23	39	56.9 N	116	25
9	Kalgan, A, Hopei	Aug 25, 26	40	51.4 N	114	51
10	Kalgan, B, Hopei	Aug 25, 26	40	49.0 N	114	51
11	Tienchen, Shansi	Aug 27	40	26.2 N	114	01
12	Peiping (Peking 1907), Hopei	Sep 3, 5	39	56.9 N	116	25
13	Shihkiachwang, A, Hopei	Sep 6	38	02.7 N	114	30
14	Shihkiachwang, B, Hopei	Sep 6	38	02.7 N	114	30
15	Wuchang, Hupeh	Nov 1, 14	30	33.7 N	114	20
16	Wuchang, Hupeh	Dec 1, 8	30	33.7 N	114	20
		1933				
17	Wuchang, Hupeh	Jan 10, 14, 21, 27	30	33.7 N	114	20
18	Zose Observatory	Feb 7-11	31	05.8 N	121	11
19	Wuchang, Hupeh	Mar 11	30	33.7 N	114	20
20	Wuchang, Hupeh	Apr 4, 29	30	33.7 N	114	20
21	Wuchang, Hupeh	May 6, 13	30	33.7 N	114	20
22	Wuchang, Hupeh	Jun 5, 10, 17	30	33.7 N	114	20
23	Ichang, B, Hupeh	Aug 12, 19	30	42.9 N	111	18
24	Ichang, A, Hupeh	Aug 23	30	43.3 N	111	18
25	Shasi, A, Hupeh	Aug 24	30	18.1 N	112	15
26	Shasi, B, Hupeh	Aug 25	30	18.1 N	112	15
27	Yochow, Hunan	Aug 31	29	27.1 N	113	12
28	Hankow, Hupeh	Sep 14, 15, 21	30	37.0 N	114	18
29	Wuchang, Hupeh	Oct 7, 21	30	33.7 N	114	20
30	Wuchang, Hupeh	Nov 11, 18	30	33.7 N	114	20
		1934				
31	Wuchang, Hupeh	Jan 2, 27	30	33.7 N	114	20
32	Wuchang, Hupeh	Mar 22	30	33.7 N	114	20
33	Wuchang, Hupeh	Apr 21	30	33.7 N	114	20
34	Wuchang, Hupeh	May 19	30	33.7 N	114	20
35	Wuchang, Hupeh	Aug 23	30	33.7 N	114	20
36	Wuchang, Hupeh	Sep 12	30	33.7 N	114	20
37	Ichang, C, Hupeh	Sep 19	30	42.5 N	111	21
38	Chengtu, Szechwan	Sep 29-30	30	38.0 N	104	03
39	Chengtu, Secondary, Szechwan	Sep 27-Oct 2	30	39.3 N	104	05
40	Yoan, Secondary, Szechwan	Oct 8	29	58.8 N	102	56
41	Hwangnipu, Szechwan	Oct 10	29	41 N	102	42
42	Nitow, Szechwan	Oct 13	29	40 N	102	24
43	Luting, Szechwan	Oct 16	29	57 N	102	12
44	Kangting, Sikang	Oct 18-21	30	04.1 N	101	51
45	Kangting, B, Sikang	Oct 22	30	03.5 N	101	51
46	Yinkwanchai, Sikang	Oct 25, 26	30	02.7 N	101	31
47	Mosimien, Sikang	Oct 31	29	40.5 N	102	08
48	Tzetati, Sikang	Nov 3	29	17.3 N	102	15
49	Fulin, Szechwan	Nov 6	29	21 N	102	46
50	Tawei, Szechwan	Nov 11	29	23 N	103	20
51	Omei, Szechwan	Nov 12	29	34 N	103	29
52	Loshan, A, Szechwan	Nov 13, 14	29	33.3 N	103	41
53	Loshan, B, Szechwan	Nov 14	29	33.3 N	103	41
54	Ipin (Suifu Repeat), Szechwan	Nov 16, 17	28	46.0 N	104	38
55	Ipin, Auxiliary, Szechwan	Nov 17	28	47 N	104	39
56	Pahsien, A (Chungking Repeat, B), Szechwan	Nov 20	29	34.6 N	106	37
57	Pahsien, B, Szechwan	Nov 21	29	33.6 N	106	35
58	Wuchang, Hupeh	Dec 11	30	33.7 N	114	20
		1935				
59	Wuchang, Hupeh	Mar 2	30	33.7 N	114	20
60	Wuchang, Hupeh	Apr 22	30	33.7 N	114	20
61	Wuchang, Hupeh	May 30	30	33.7 N	114	20
62	Wuchang, Hupeh	Sep 5	30	33.7 N	114	20
63	Zose Observatory	Sep 10-13	31	05.8 N	121	11
64	Wuchang, Hupeh	Oct 5	30	33.7 N	114	20

Table 8--concluded

No.	Station	Date	Latitude	Longitude East
		1936	° ′	° ′
65	Wuchang, Hupeh	Mar 17	30 33.7 N	114 20
66	Wuchang, Hupeh	Apr 17	30 33.7 N	114 20
67	Wuchang, Hupeh	May 15	30 33.7 N	114 20
68	Wuchang, Hupeh	Jun 18	30 33.7 N	114 20
69	Wuchang, Hupeh	Jul 11	30 33.7 N	114 20
70	Zose Observatory	Jul 20-23	31 05.8 N	121 11

Tibetan frontier to Hankow were made on foot over roads which were in very bad condition because of snow and rain. On reaching Tzetati, I hired a small boat for the trip to Fulin, making a portage en route. From Fulin to Kiating, carriers were used; we traveled on foot over high mountains from dawn to dusk for two days. On the next day we lost our way, losing a half-day's time. We arrived in Tawei on November 11, but since there was no sunshine, we did not stop, reaching Omei the next day. We then marched 27 miles to Kiating, going to Suifu by boat, reaching Hankow by steamer on November 26. Here I resumed my duties as treasurer of the mission office.

More details of my expedition in 1934 in West China are given in the following paragraphs.

West China can be said to begin at the Treaty Port of Chungking, which place was reached by steamer via Ichang and the famous Yangtze Gorges.

The portion of the journey from Chungking to Chengtu, about 350 miles, can be accomplished by private car or public bus, the bus taking two days via Neikiang. The road was an all-weather road for the first day; the second half of the route has not been surfaced, travel not being possible in wet weather or for some days following rains. There has been a motor road from Chengtu to Yaan (Yachowfu), and the journey of some 110 miles has been made in a day. Owing to the civil wars of the past few years, motor travel was practicable only as far as Sintsing, 30 miles, the bridges being out of repair beyond that point. I took a rickshaw to Kiungchow, 30 miles further on, from which Yaan was a two-day journey on foot. The instruments and baggage were sent by carrier from Chengtu, a journey of four days.

The direct distance from Yaan to Kangting (Tatsienlu) is about 65 miles, but because of the tangle of high mountains which lies between, the main road makes a large "V", going first southwest to Hanyuan (Chingchihsien), and then turning west and north to Luting and Waszekeo on the T'ung River before turning west again for the last 20 miles in to Kangting. This route took eight days' travel and crossed two high passes, the first, the Ta Hsiang Ling at 8,600 feet, and the second, the Fei Yueh Ling at 9,300 feet. Though the paved stone road was in very bad repair, it carried a surprising amount of traffic. It was lined with villages and hamlets along that portion of the route traversed during the first three days. At Hanyuan it divided, one route continuing southwards to Fulin and the province of Yunnan. Westward traffic consisted mainly of long lines of coolies carrying heavy loads of brick tea to the "Gateway of Tibet" (Tatsienlu), to be sent from that point to the interior by yak caravan on journeys of two and three months to Lhasa and beyond. There was also a trade in rice, cotton goods, and manufactured articles. Coming east were mule and coolie caravans with wool, musk, horns, hides, rhubarb, and other roots for the manufacture of Chinese medicines.

Opium smoking has been practically universal throughout this region, and this practice, together with numerous civil wars, has contributed to the distressing poverty of the people. Travel was slow because the coolies relied on their "pipes" to give them enough energy to get from one stage to another. My men had a minimum of three "pipes" a day, but they had to smoke more frequently in crossing the two passes.

A "new road" shortening the journey by one day's travel and avoiding both of the high passes, has been put through but owing to the excessive rainfall in the summer, it had been washed out in several places and closed temporarily. There was also a very steep route from Yaan via Tienchuan to Tatsienlu, which could be covered in five days. I was unable to procure any coolies in Yaan willing to travel via this route because of the difficulty of securing food and the necessity of carrying loads on the backs of the coolies. In addition to the usual difficulties, the summer rains had destroyed the mountain bridges and had washed out the ledges along which the path lay.

In the Tatsienlu area, plans for proceeding northwards via Tanpa, and thence eastwards to Kwanhsien and Chengtu via Mowkung were abandoned owing to lack of time. A short round trip to the Tibetan grasslands was carried out before beginning the return journey to Hankow. A Tibetan and three horses were engaged for the journey over the Cheto Pass (15,000 feet) to the hamlet of Yinkwanchai, two days' journey along the old Amban road to Lhasa, via Batang. The return was made over the Zu-zong Pass at about 16,000 feet.

From Tatsienlu to Kiating (Loshan) the main route lies via Luting, Hanyuan, and Yaan and makes the three legs of a double "V". Since the journey from Yaan had been by this route, it was decided to travel southwards to Tzetati where the T'ung River turns eastward, and thence in the general direction of Kiating. This proved to be a very difficult journey since it was not a main road. Though shorter in map miles than the "V" route, in actual travel it took five days longer. Proceeding southwards from Tatsienlu, the first day led over a snow-covered pass at 12,800 feet, down through thick forests into the old glacial valley of Mosimien. The route skirted the Minya-Konka complex, a magnificent range of mountains, the main peak rising to 24,600 feet. Except for the first day, the mountain range was covered with cloud which effectively robbed the expedition of the glory of the scenery.

It seemed at times on the section of the road between Mosimien and Tzetati that it would be impossible to get through with our pack animals. The rains had washed out parts of the narrow track along the steep mountain slopes or had caused large landslides. At such places it was necessary to unload the animals and to carry the baggage ourselves, while the Tibetan muleteer found some other route for the beasts, either down along some stream bed or gully, or up the mountainside above the affected area. At one place the swaying iron suspension bridge across a deep gorge was in such bad repair that it was necessary to take down the front of a shop in a nearby hamlet and use the boards to make a plankway for our scared mules. Had it not been for the friendly help of the head man, we should have had to return to Tatsienlu.

At Tzetati, on the roaring T'ung River, the mules were sent back and the journey continued by boat to Fulin. This could have been made in a few hours if the water had been higher, but two of the many rapids were so dangerous that all the cargo of hides, coffin boards, and bales of medicinal roots had to be portaged over half a mile of rocks. This caused a delay of one day in all. The river was one continuous rapid for the whole 60 miles, and in the larger rapids the waves were surprisingly high. Here the role of steersman requires great accuracy and skill, the boat being turned completely around at times by the raging waters.

Although condensed milk was not procurable at Fulin, it was possible to buy supplies of fruit, eggs, and flour cakes. After a little difficulty, some men were found willing to face the trip to Omei via Chinkeoho, but since everything had to be carried on their backs, it was considered advisable to take six men instead of four. An agreement was reached to make the journey to Omei in five days as a maximum, a fine to be imposed for every day beyond that period. The trip of a direct distance of 60 miles actually took five and a half days. It was impossible to hold to the agreement however, since the so-called road was a long bog of greasy clay most of the way. The weather was at its worst, with rain, snow or mist all the way, and though the altitude reached at one place was 8,800 feet, no view of the surrounding country could be obtained. Washan, an extinct volcano 11,000 feet high, was skirted on its northern slopes by a path leading down from the So-I-P'in at 8,800 feet to Chinkeoho at 1,750 feet without a glimpse being obtained of the mountain itself. The whole region was sparsely populated by very poor people. Potatoes and cornmeal were the only supplies procurable.

The bad weather continued at Omei, and it was therefore decided not to ascend the mountain, about 11,000 feet, for a reoccupation of the 1916 magnetic station, especially since the summit is an old crater of basalt rock.

The road from Omei to Kiating was good, passing over a very fertile plain on the Yangtze water system. Steamers ascend to this point from Chungking during the summer and fall months. After reoccupation of the 1916 observing point, the journey was continued by small boat to Suifu in one and a half days, and thence to Chungking, another day and a half by steamer. From Chungking there were steamers nearly every day to Ichang, Hankow, and Shanghai, and it was one of these, the Min Chiang, which brought the party back to Hankow on November 26 after an absence of nine weeks.

The route followed was not that originally planned, which was to have been from Chengtu north to Songpan, 12 days, thence to Mongkong, Tanpa, and Tatsienlu, about 20 days. From Tatsienlu the big road would have been taken to Yaan, and from that point the return made to Hankow via Kiating, Suifu, and Chungking. This would have procured a far better set of secular-variation values, and the new area covered would have been larger. As it was, the observations taken cover a comparatively small area, and are moreover in a region usually hidden in clouds.

This change of plans was made necessary by the earthquake of two years before which had wiped out a large section of the road between Kwanhsien and Songpan. Details of this were first learned on arrival in Chengtu at the end of September. It was therefore decided to go west from Chengtu via Kwanhsien to Tanpa, and thence south to Tatsienlu and Tzetati. This plan in turn had to be abandoned because of the rivalry of the 24th and the 28th Szechwan Army divisions. In Chengtu, owing to the resignation of General Liu Hsiang, there was no responsible authority to issue a passport which would be acceptable in both territories. Owing to the advance of the army to the northeast of Szechwan, political conditions were further complicated, and the excessive rains of the summer had washed out bridges and large sections of road, causing postponement of many of the motor bus services from the provincial capital.

Since the Tanpa and Tatsienlu areas were controlled by the 24th Army, and they had been driven out of Chengtu by the 28th Army, it became necessary to go first to Yaan, four days' travel by carrier to the southwest. Here a passport was procured from General Liu Hsiang, but this southern detour was unfortunate since the round trip had to be reversed in direction Yaan-Tatsienlu-Tanpa-Mongkong-Chengtu, and from that point a needless duplication again either to Chungking by bus or again to Yaan en route to Kiating.

On arrival at Tatsienlu, local inquiries showed that there would not be sufficient time to complete the circuit to Chengtu, and the route via Tzetati and Chinkeoho was followed instead.

The province of Szechwan is notorious for its overcast skies. No delays were made for astronomical observations since the observing points were quite close together. The Sun appeared occasionally for a few moments at some of the stations, although on the Tibetan Plateau west of Tatsienlu, the sky was cloudless. Throughout the nine weeks of travel the weather was generally bad. Spring and summer are less likely to be overcast for such long intervals of time. In Chungking the people say, "The dogs bark when the Sun shines."

During 1935 observations were made at Wuchang and intercomparisons of instruments at the Zose Observatory. In August, 1936, I returned to the United States, and on landing I sent the instruments to Washington.

E. C. BULLARD, ON MAGNETIC WORK IN AFRICA, NOVEMBER, 1933, TO FEBRUARY, 1934

The magnetic work described in this report was carried out with the assistance of Mrs. Bullard while on a journey, the main object of which was the determination of gravity at as many points as possible in East Africa with special attention to the Rift Valleys. The distribution and number of magnetic stations was determined by the progress of the gravity work rather than by what would have been most desirable if the main object of the journey had been magnetic measurements. The Ordnance Survey lent their coil magnetometer for the work.

Table 9

No.	Station	Date	Latitude	Longitude East
		1933	° ′	° ′
1	Kijabe, Kenya Colony	Nov 28, 29	1 01.6 S	36 34
2	Naivasha, Kenya Colony	Nov 30, Dec 2	0 46.5 S	36 26
3	Gilgil, Kenya Colony	Dec 4	0 27.5 S	36 16
4	Kampi ya Moto, Kenya Colony	Dec 10	0 07.1 S	35 56
5	Nanyuki, Kenya Colony	Dec 13, 14	0 02.0 N	37 05
6	Fort Hall, Kenya Colony	Dec 18	0 43.0 S	37 10
7	Equator, Kenya Colony	Dec 24, 25	0 00.7 S	37 32
8	Kisumu, A, Kenya Colony	Dec 26, 27	0 05.8 S	34 45
9	Kisumu, B, Kenya Colony	Dec 27, 28	0 05.0 S	34 45
		1934		
10	Kampala, Uganda	Jan 7	0 18.6 N	32 34
11	Jinja, Uganda	Jan 14	0 25.2 N	33 12
12	Gondokoro, Anglo-Egyptian Sudan	Jan 22, 23	4 54.4 N	31 39
13	Bogoro, Belgian Congo	Jan 29	1 25.2 N	30 17
14	Kissenyi, Belgian Congo	Feb 6, 7	1 41.8 S	29 14
15	Kichwamba, Uganda	Feb 11	0 15.1 S	30 05
16	Fort Portal, Uganda	Feb 14	0 40.0 N	30 17
17	Hoima, Uganda	Feb 17, 18	1 25.6 N	31 22
18	Kampala, Uganda	Feb 19	0 18.6 N	32 34
19	Kisumu, B, Kenya Colony	Feb 23	0 05.0 S	34 45

On arrival at Nairobi, the Department of Terrestrial Magnetism's theodolite magnetometer No. 18 was borrowed from the British East Africa Meteorological Service. Unfortunately, the tent constructed by the Meteorological Service was found too heavy and too complicated to erect and was left in Nairobi. It was found impossible to use magnetometer No. 18 for horizontal force measurements because of draughts disturbing the oscillation measurements; the coil magnetometer was therefore used at all stations except at Nairobi, where the two instruments were compared. As only a short time was available for this comparison, one set of observations was made with magnetometer No. 18, a number of measurements being made with the coil magnetometer while these were in progress. The instruments were compared for declination measurements several times during the journey.

Because the telescope on the coil magnetometer was not adjustable in a vertical plane, the azimuth mark had to be nearly in the horizontal plane through the instrument; this restricted the choice of marks, and it was sometimes necessary to use a mark closer than that recommended.

Mrs. Bullard and I left England on October 20, 1933, and traveled to Mombasa via the Suez Canal, arriving on November 17. After making a measurement of gravity there, we traveled to Nairobi by train where we spent a week collecting camp equipment and buying a lorry. About a month was spent in a circular trip from Nairobi. The route followed the west branch of the Rift Valley as far as Lake Baringo, and we traveled back to Nairobi past the west side of Mount Kenya.

Nairobi was reached on December 19. After a stay of three days, during which some damage to the lorry was repaired, the journey to Uganda was begun. A delay of several days was caused by the loss of the frame aerial used to receive time signals; a new one was constructed which worked satisfactorily.

An attempt was made to reoccupy the CIW station of 1909 and 1921 at Kisumu; because a large local disturbance was found, a new station was established outside the town.

The next section of the journey (January 15 to 21) was from Jinja to Juba in the Anglo-Egyptian Sudan. A close reoccupation of the CIW station at Gondokoro was made.

After staying two days at Juba we turned south and from January 24 to February 6 traveled as far as Kissenyi through the Belgian Congo along the west side of the Albert-Edward-Kivu Rift Valley. Magnetic observations were made at Bogoro and Kissenyi.

From Kissenyi, we returned to Uganda via Kabale, and went north along the east side of the Rift as far as Butiaba on Lake Albert, the journey being made February 7 to 17. Magnetic observations were taken at Kichwamba, Fort Portal, and Hoima, a practical reoccupation of the CIW station being made at Hoima.

From Hoima, we returned to Kisumu via Kampala between February 18 and 23, further observations being taken at Kampala and Kisumu. From Kisumu we returned to Nairobi, via Kitale, between February 24 and March 1. Magnetometer No. 18 was returned to Mr. Walter at the British East African Meteorological Service on March 5, 1934, and we traveled south to Arusha visiting Magadi on the way between March 5 and 7. From Arusha, we visited Ngorongoro and then returned to Mombasa, ascending part of the way up Kilimanjaro (not with the car!) on the way. This trip was made March 8 to 17. From Mombasa, excursions were made north to Malindi and south to Pangani; the car was then sold, and we left Mombasa on April 1 and returned to England round the Cape of Good Hope.

ODD DAHL, ON MAGNETIC WORK IN ASIA AND EUROPE, JULY, 1928, TO APRIL, 1929

In accordance with an arrangement with the Department of Terrestrial Magnetism, I occupied stations when possible while traveling in Southwestern Asia on leave for one year.

Accompanied by my wife, I left Washington on May 15, 1928. My instrumental outfit consisted of magnetometer inductor No. 25, with tripods, and a pocket chronometer. I had also the necessary forms and stationery and a nonmagnetic tent supplied by myself.

Our party, consisting of Mrs. Dahl, Per Magnus, and myself, landed with equipment and baggage at Port Said, Egypt on July 13, 1928. From Port Said we proceeded by an Italian steamship to Beirut on the Syrian coast where I obtained, from the French high commissioner for Syria, letters of introduction to the various local authorities en route. I also made investigations here regarding traveling conditions and found that it would best suit my purpose to travel in some kind of boat by the Euphrates River. At the office of the high commissioner, I was introduced to Captain Deliene, the French officer in charge of the telegraph department who was responsible for the magnetic data obtained by the French army in Syria. He kindly supplied me with copies of his magnetic results, and also attempted to obtain time signals for a chronometer comparison at their radio station, but this, unfortunately, failed.

Table 10

No.	Station	Date	Latitude	Longitude East
		1928	° ′	° ′
1	Aleppo, Syria	Jul 23	36 13.3 N	37 07
2	Jerablus, Syria	Jul 30	36 48.9 N	38 06
3	Meskene, Syria	Aug 5	36 01.7 N	38 11
4	Rakka, Syria	Aug 13	35 56.4 N	39 02
5	Abu Kemal, Syria	Aug 30	34 27.3 N	40 53
6	Bagdad, Iraq	Sep 7	33 16.2 N	44 32
7	Bagdad, Iraq	Sep 10	33 16.2 N	44 32
8	Babylon, Iraq	Sep 23	32 33 N	44 26
9	Kizil, Robat, Iraq	Sep 28	34 10.5 N	45 08
10	Teheran, Persia	Oct 26	35 43.1 N	51 25
11	Damghan, Persia	Oct 31	36 11.2 N	54 18
12	Sabzawar, Persia	Nov 3	36 09.6 N	58 08
13	Sharifabad, Persia	Nov 8	35 50.2 N	59 23
14	Shusp, Persia	Nov 13	31 40.3 N	60 08
15	Khunak, Persia	Nov 14	30 58.6 N	60 35
16	Duzdap, Persia	Nov 16	29 29.1 N	60 54
17	Nok-Kundi, Baluchistan	Nov 20	28 50.5 N	62 46
18	Nushki, Baluchistan	Nov 25	29 32.9 N	65 59
19	Channu, India	Dec 3	30 29.0 N	72 14
20	Lahore, India	Dec 6	31 37.1 N	74 34
21	Delhi, India	Dec 12	28 41.1 N	77 14
22	Benares, India	Dec 17	25 19.1 N	82 59
		1929		
23	Besserud, Norway	Apr 15	59 59.1 N	10 43

Having planned to drift down the Euphrates from the Turkish border, we proceeded by rail from Beirut to Aleppo in north Syria where I occupied the first magnetic station on July 23. However, I was forced to discontinue before the observations were completed, on account of a violent sandstorm. I had planned to reoccupy the CIW station of 1910, but the erection of a military building on that site made it necessary to select another location. A spot was chosen at some little distance from the former location and on the opposite side of the Alexandretta road.

On July 26, we left Aleppo by hired motor car, and after crossing a strip of desert, we reached the banks of the Euphrates near a small village called Djerablus on the border of Turkey. Here a second magnetic station was occupied, with the temperature about 50 degrees centigrade in the observing tent.

The arrangements for a boat required some time, and camp was made on the riverbank. We had brought with us provisions for several weeks as the country through which the river passes is but sparsely inhabited by very poor people, with an occasional nomad tribe spending the dry season near the river. We finally succeeded in securing a boat, somewhat like a small transport barge, which we altered to suit our purpose, it being large enough to enable us to live aboard day and night. I engaged a native boatman as a helper but gave him up half way down the river.

The river itself is interesting but the surrounding country is very barren and desolate. Only here and there along the banks were there cultivated areas, made productive by irrigation, the water being raised from the river by primitive pumps. Rice and corn were the staple crops. A feature of great interest was the large number of ruined castles, dating from periods as early as before Christ, scattered along the banks and dominating the higher rock formations. Some of these castles were remarkably well preserved. I occupied the next magnetic station near a small village called Meskene and experienced some difficulty as the mark frequently became obscured by drifting sand. We were much troubled by violent gusts of wind which raised sand clouds, especially during the afternoons. Keeping the sand out of the instruments presented a problem, and I took the precaution of wrapping the instrument cases in several layers of calico.

On August 11, we arrived at a small aviation camp at Rakka where we remained for two days as guests in the camp. Another magnetic station was established here close by a location of known latitude and longitude. From this camp we had planned a trip by plane to a certain half-buried town about 200 miles distant, but just before our arrival the pilot and mechanic of the plane had been killed in an accident.

Soon after leaving Rakka, the river widened and the current became weaker so that we had to depend much upon the prevailing northwest winds. We made very slow progress and at the end of three weeks had covered only 250 miles. At Ed Deir we abandoned the boat, and through the kindly assistance of the French garrison, we succeeded in purchasing a motor car. This car had been bought in Damascus two months previously and the owner demanded cash, refusing to accept a check. There being no bank in Ed Deir this presented a difficulty which I could see no way of overcoming until the French officers, who were making a trip to Aleppo by plane, very generously offered to take my checks along and bring back the cash, thus solving my problem.

Though there are no constructed roads in this region, the terrain is such as to permit of motoring in practically any direction. Our plan was to follow the banks of the river until we could cross over to Bagdad. The heat was terrific in the desert in this, the hottest, season of the year, and I had considerable trouble keeping the motor from overheating. While observing at a magnetic station near the Iraq border we encountered a large Bedouin tribe. They invited us to dinner, and we ate boiled mutton and rice with our fingers from a large copper platter.

In Iraq, after difficulty with the border gendarmes, I was escorted to the nearest large village where I was graciously received but compelled to pay a custom guarantee permitting me to proceed to the Bagdad customhouse. We continued along the river which was later crossed by ferry, thence across the plain between the Euphrates and Tigris Rivers, arriving in Bagdad on September 2.

The customs regulations in Iraq are very strict and rigidly enforced. However, aided by the American consul, everything was finally in order. The American consul also introduced me to certain civil officials from whom I obtained permission to carry out the magnetic work and who also secured for me a permit to carry arms. The consul was much interested in my travel and work and entertained us in his home.

A magnetic station was occupied at Bagdad, a good site being found on the grounds of the British Experimental Farm some miles southeast of the city, where, in addition to the regular magnetic work, diurnal variation in declination was observed, and chronometer corrections were obtained by wireless.

As my route of travel would lead me next into Persia, I called upon the Persian consul general to get my papers in order. Because of my special reason for wishing to pass through Persia, he did not care to take the responsibility of giving me a visa until he was advised by his government. However, he promised to arrange everything in a week's time. The week passed with no results, and finally the American consul made arrangements by telegraph, through the legation in Teheran. In the meantime, we all drove down to the ruins of Babylon about 60 miles south of Bagdad, remaining two days. Magnetic observations were begun here but were left unfinished because of an attack of dizziness suffered by the observer. When we returned to Bagdad I was notified that the Persian consul was ready to give me the visa and that I might use my instruments on giving a written explanation to the officials in Teheran.

Teheran and Bagdad are connected by a fair road, but there are no facilities for repairs along the way. The grades are so steep that the Iraq authorities do not permit a car to leave for Teheran until it has been duly inspected by the police and given a certificate. It must carry a specified list of spare parts, usually purchased in Bagdad, of course. With all this delay we found it impossible to leave until September 27.

It took us eight days to reach Teheran camping at night as usual. In Kermanshah our journey nearly came to a disastrous end. It was dark when we entered the town, and I drove the car into a large excavation in the middle of the street which I had failed to detect with the headlights. Both front tires exploded and all the baggage was thrown off by the impact. Fortunately the only damage to the car itself was a splintered running-board. With the kindly assistance of people on the street, the car was pulled out.

In Teheran, the same procedure as in Bagdad prevailed regarding customs and permits, and again the American legation rendered invaluable assistance. Persian officials suspected that I hoped to discover radium with my instruments. I was closely questioned and my answers doubtfully received, but I was very courteously treated and the police director offered me a military escort which I, of course, declined with thanks. A magnetic station was occupied here, just outside the walls of the city.

I decided now to continue through Persia to the border of Baluchistan, thence into the northwestern part of India. I had no hesitation about attempting the journey by auto as the car had been running splendidly; and though the road ended at Teheran, the open country east of that point is much traveled by motor cars. Upon inquiring at the British legation concerning conditions in Baluchistan, I learned that they usually do not permit motor cars to drive through, although permission had been granted in a few previous instances. The reason for this is that parts of the country are little inhabited and without roads. Water and food are scarce and on account of the unsettled condition, the passage is not safe for unprotected travelers. Upon consideration however, they decided to recommend my petition to the Indian government and promised that I should have a reply with the British political agent when we reached the border.

The topography of central Persia is such that passage is impossible with the ordinary motor car. It was necessary, therefore, for us to follow the Elburz mountains eastward toward Russian Turkestan, thence southward, following generally along the Afghanistan boundary, until we reached the village on the Baluchistan border. Between Teheran and Meshed, the holy city of Persia, travel conditions were difficult and many times it was necessary to unload baggage and equipment and drive the empty car very slowly over bad stretches of terrain; baggage and equipment then had to be carried across and the car reloaded. Frequently surface water was encountered, and on one occasion the engine stalled upon getting into water of sufficient depth to cover the intake of the carburetor.

In Meshed, we rested a few days and sought information regarding the route southward. Leaving Meshed on November 7, we camped a short distance south of the village of Sharifabad where a magnetic station was established. Proceeding, we followed the old caravan route leading to India, through very desolate country, one of our main difficulties along this portion of our route being the scarcity of water which was generally brakish and sulphurous. Additional magnetic stations were occupied at Shusp and Khunak. We finally reached Duzdap on the border where we received the promised papers permitting us to enter and travel through India, and I made preparations for the journey across the Baluchistan desert.

Hitherto we had been able to obtain gasoline at many places along our route and very seldom found it necessary to carry any reserve supply, as automobiles are in more or less common use in Persia, but entering Baluchistan it was necessary to carry all motor fuel as well as all food supplies for a 500-mile journey. Before leaving Duzdap, a magnetic station was established on the grounds of the British political agency.

This part of our journey provided the most difficult travel conditions of the entire trip on account of the loose sand which caused us considerable delay and much hard work. We were frequently stuck in the sand for several hours at a time, and at other times had to prepare a matting of desert shrub over otherwise impassable stretches before attempting to drive the car across. Two magnetic stations, at Nok-Kundi and Nushki, were occupied while en route through Baluchistan. At the latter place, our supply of gasoline became exhausted, but I was able to obtain enough from an aviation emergency station to enable us to reach Quetta. Arriving at Quetta in early winter, we encountered colder weather and even snow in the high mountains, which were crossed at an elevation of about 8,000 feet, before decending to the Indian plain. Uprisings in Afghanistan were in progress at this time, and we were compelled to follow an armed escort through the Loralai civil division. Having finally crossed the Sulaiman mountain range, we decended into the Punjab civil division of India.

Thus far in India the roads had been fairly good, but after crossing the Indus River, over a bridge of boats, we found the surrounding country so flat and muddy that road construction is next to impossible, and traffic moves over a sort of floating road consisting of coarse grass matting held down by heavy wire netting.

A magnetic station was occupied near Channu on the bank of the main irrigation canal in Punjab, after which we proceeded northeast to Lahore. From here on we followed "The Grand Trunk Road" all the way down to Calcutta, magnetic stations being occupied at Lahore, Delhi, and Benares, en route. We arrived at Calcutta on December 22, where a final rating was obtained for my chronometer, 22 magnetic stations having been occupied on the journey from Beirut.

Return to Europe was made by steamship, direct from Calcutta to Antwerp, thence to Norway. A magnetic station was occupied at Oslo, and after a few weeks in Norway I returned to the United States where I reported at the office on May 11.

It is a pleasure to acknowledge the cordial and courteous treatment accorded me and my party by various United States consulates and the government officials of the various countries visited. I particularly wish to record my indebtedness to the French high commissioner for Syria, Captain Gaston Allangue at Rakka, Mr. Djevad Khan Sineki in Persia, and Major E. Wickham of Quetta, who rendered very effective assistance facilitating my work in Baluchistan and India.

A. L. DAWSON AND A. E. MARKEY, ON MAGNETIC WORK IN AUSTRALIA, JUNE, 1934, TO MARCH, 1936

The work of this survey was carried out by the Australian government authorities using instruments supplemented by the loan of CIW magnetometer No. 6. Table 11 gives the stations occupied.

Table 11

No.	Station	Date	Latitude	Longitude East
		1934	° ′	° ′
1	Port Victor, South Australia	Apr 18, 19	35 33.7 S	138 33
2	Goolwa, South Australia	Apr 20, 21	35 30.0 S	138 48
3	Strathalbyn, South Australia	Apr 23, 24	35 15.4 S	138 53
4	Kuitpo Forest, South Australia	Apr 25, 26	35 12.8 S	138 43
5	Nairne, South Australia	Apr 27, 28	35 02.3 S	138 55
6	Ceduna, South Australia	Jul 25, 26	32 08.2 S	133 40
7	Yalata Head, South Australia	Jul 29, 30	31 56.4 S	132 22
8	Flinders, South Australia	Aug 2, 3	32 47.9 S	134 14
		1936		
9	Ardrossan, Yorke Peninsula	Mar 17, 18	34 24.9 S	137 54
10	Maitland, Yorke Peninsula	Mar 19	34 22.0 S	137 40
11	Yorketown, Yorke Peninsula	Mar 20, 21	35 01.2 S	137 37
12	Edithburg, Yorke Peninsula	Mar 21, 22	35 04.3 S	137 44

R. G. FITZSIMMONS, ON MAGNETIC WORK IN NORTH AMERICA, JULY TO OCTOBER, 1943

The observations were made chiefly with CIW magnetometer inductor No. 16, but in a few cases declination was observed with the United States Coast and Geodetic Survey compass inclinometer No. 11. Table 12 lists the stations at which observations were made.

Table 12

No.	Station	Date	Latitude	Longitude East
		1943	° ′	° ′
1	Julianehaab, Greenland	Jul 18	60 43 N	313 59
2	Ivigtut, Greenland	Jul 22	61 12.1 N	311 50
3	Narsalik, Greenland	Jul 25	61 38.4 N	310 41
4	Frederikshaab, Greenland	Jul 26	61 59.7 N	310 20
5	Frederikshaab Glacier, Greenland	Jul 27	62 28.4 N	309 39
6	Fiskenaes, Greenland	Jul 28	63 05.3 N	309 18
7	Marrak, Greenland	Jul 29	63 26.3 N	308 46
8	Faeringerhavn, Greenland	Jul 30	63 41.2 N	308 17
9	Godthaab, Greenland	Aug 2	64 10.4 N	308 14
10	Kapasigdlit, Greenland	Aug 4	64 25.7 N	309 44
11	Atangmik, Greenland	Aug 5	64 47.8 N	307 49
12	Sukkertoppen, Greenland	Aug 6	65 24.6 N	307 07
13	Cruncher Island, Soudrestrom Fiord 1, Greenland	Aug 8	66 01.5 N	306 27
14	Agto, Greenland	Aug 10	67 56.7 N	306 24
15	Egedesminde, Greenland	Aug 11	68 42.5 N	307 07
16	Jakobshavn, Greenland	Aug 12	69 13.3 N	308 53
17	Holstenborg, Greenland	Aug 15	66 55.9 N	306 22
18	Kugssuak, Soudrestrom Fiord 2, Greenland	Aug 17	66 44.8 N	308 24
19	Soudrestrom Fiord 3, Greenland	Aug 19	66 58.8 N	309 19
20	Angmagssalik Fiord, Greenland	Aug 23	65 56.3 N	322 14
21	Angmagssalik, Greenland	Aug 24	65 36.7 N	322 22
22	Comanche Bay, Greenland	Aug 26-28	65 03.8 N	319 41
23	Nanortalik, Greenland	Sep 11	60 08.3 N	314 43
24	Frederiksdahl, Greenland	Sep 12	59 59.8 N	315 20
25	Prince Christian Sound, Greenland	Sep 13	60 02.1 N	316 50
26	Ilivilik Fiord, Greenland	Sep 15	60 48.5 N	317 11
27	Grinnell River (Baffin Island), Canada	Oct 2, 3	63 44.9 N	291 35
28	Fort Chimo, Canada	Oct 6	58 06.4 N	291 36
29	Payne Bay, Canada	Oct 9	60 00.8 N	289 54
30	Hebron, Labrador	Oct 18	58 12.6 N	297 21
31	Nain, Labrador	Oct 20	56 32.8 N	298 19
32	Hopedale, Labrador	Oct 22	55 27.1 N	299 48
33	Long Tickle, Labrador	Oct 24	55 01.0 N	301 12
34	Goose Bay, Labrador	Oct 31	53 18.8 N	299 34

R. E. GEBHARDT, ON MAGNETIC WORK IN CENTRAL AMERICA, APRIL AND MAY, 1931

The work of this brief survey was undertaken in the course of a return journey from the Huancayo Magnetic Observatory in Peru to the United States, following a period of duty as observer at the observatory. Table 13 lists the stations occupied.

Table 13

No.	Station	Date	Latitude	Longitude East
		1931	° ′	° ′
1	Utiva Island, Costa Rica	Apr 19, 20	10 00.1 N	277 00
2	San Jose, A, Costa Rica	Apr 23, 24	9 57.2 N	275 56
3	San Jose, B, Costa Rica	Apr 26	9 57.6 N	275 54
4	San Jose, D, Costa Rica	Apr 28-May 1	9 57.0 N	275 52
5	Granada, Nicaragua	May 9	11 56.7 N	274 00
6	Corinto, B, Nicaragua	May 16	12 29.1 N	272 49

F. R. GRACELY, ON MAGNETIC WORK IN NORTH AMERICA, JULY TO OCTOBER, 1941

In carrying out the program of magnetic observations of the Louise A. Boyd Expedition in 1941, observations were made at nine places (ten stations) in Canada, Newfoundland, and Labrador, and at seven places in Greenland. Declination, horizontal intensity, and inclination were observed at all stations, and latitude, longitude, and azimuth observations were made when weather permitted. The instrument used was magnetometer inductor No. 16 at all stations except Dundas Harbor, where compass dip circle No. 222 was used in addition to the

Table 14

No.	Station	Date	Latitude	Longitude East
		1941	° ′	° ′
1	St. John's, E, Newfoundland	Jul 1	47 33.8 N	307 20
2	St. John's, C, Newfoundland	Jul 2	47 34.4 N	307 16
3	Sangmissok, Greenland	Jul 13	59 59.7 N	316 06
4	Julianehaab, Greenland	Jul 18	60 43 N	313 59
5	Narsarssuak, Greenland	Jul 21	61 12.4 N	314 34
6	Godthaab, Greenland	Jul 30	64 11.6 N	308 15
7	Upernivik, Greenland	Aug 8	72 47.4 N	303 48
8	Thule, Greenland	Aug 12	76 34.3 N	291 11
9	Etah, Greenland	Aug 15, 16, 18	78 19.5 N	287 20
10	Dundas Harbor (Devon Island), Canada	Aug 26, 27	74 34.0 N	277 30
11	Pond Inlet (Baffin Island), Canada	Aug 31	72 42.3 N	281 59
12	Clyde River (Baffin Island), Canada	Sep 5	70 27.9 N	291 25
13	Fiord North of Cape Searle (Baffin Island), Canada	Sep 9, 10	67 40.8 N	295 24
14	Pangnirtung (Baffin Island), Canada	Sep 14, 15	66 05 N	294 25
15	York Sound (Baffin Island), Canada	Sep 21, 22	62 25.9 N	293 30
16	Hopedale, Labrador	Oct 1	55 27.2 N	299 44
17	Battle Harbor, Labrador	Oct 7	52 16.7 N	304 24

magnetometer inductor. Reoccupation of former stations of the Dominion Observatory were obtained at Dundas Harbor, Ponds Inlet, Pangnirtung, Canada; and Battle Harbor, Labrador. At some stations the astronomical observations were incomplete owing to bad weather.

At Dundas Harbor, during the first day of the expedition's stay there, observations were made near the ruins of some Eskimo huts on a cape about two kilometers southwest from Dundas Harbor settlement. Before beginning the second day's observations, the bronze bench mark placed on a previous occasion by an observer of the Dominion Observatory staff was discovered and observations were made there. As no latitude or azimuth observations were possible, a round of angles between prominent objects was secured. The observations at Ponds Inlet were made on a bench mark labeled "Dominion Land Surveys, No. 1682, 1922." For this station, the azimuth observed was that of the flagpole on the residence of the manager of the Hudson Bay Company's store.

Both Clyde River and Cape Searle were new stations with complete magnetic and astronomical observations. They were marked by brass plugs set in embedded rocks and surrounded by cairns. The observations at Pangnirtung were made at the Dominion Observatory benchmark. No latitude observations were possible but an afternoon set of azimuth observations was made. York Sound was a new station with complete observations. It was marked by a brass disk. The Battle Harbor station was at a point marked by the bench mark of the Dominion Observatory.

At St. John's, Newfoundland, the old magnetic station could not be exactly located as the site was found to be a plowed field, with potatoes growing. The stone marker was in the field, but it had been plowed up and broken. For future work the site was expected to be even less available than on this occasion, as plans were being discussed for building in that area. Accordingly, as close a reoccupation as possible was made at the old site on one day, and on the following day a new site was selected and observations were made there. The new site was chosen only after careful discussion with local authorities who felt that it had a reasonable chance of being permanently available.

J. W. GREEN, ON MAGNETIC WORK IN GUATEMALA, FEBRUARY TO MARCH, 1940

I left Washington on December 11, 1939, accompanied by Mr. W. J. Rooney whom I was to assist with earth-resistivity work before beginning the magnetic program. We arrived in Guatemala City on December 17. My part in Mr. Rooney's assignment was completed on February 15, 1940.

My instrumental equipment consisted of CIW magnetometer No. 27, Askania vertical force variometers (89809) Nos. 19 and 20, a quartz horizontal force magnetometer (QHM) No. 44, and chronometer D50107.

The magnetic work consisted of a local magnetic survey of the region about the volcano Santa Maria, with stations spaced at intervals of 0.5 kilometer to 19 kilometers. These stations were nearly all taken along local roads, and in most instances were arranged to give more detailed magnetic profiles near the volcano than were obtained by McNish during the previous year. [See report by McNish on magnetic work in 1939.] During six weeks, measurements of vertical intensity were made at 745 stations, of which nine were repeat stations, and measurements of horizontal intensity at a few stations. The physiography of the regions traversed showed outcrops of igneous rocks, and there were many detached boulders, especially along the barrancas, varying in size from mere pebbles to eight or ten feet in diameter. A large percentage of these rocks contain magnetite and yield locally complex fields superposed upon that supposedly associated with broader systematic features of the internal structure of the volcano and its surroundings.

The detailed results will be presented elsewhere, and only those for the base stations at Guatemala City and Quezaltenango are given in the present volume.

Throughout my work in Guatemala I received every possible assistance from Dr. E. G. Zies as leader of the expedition, and my success in carrying out my part of the program was in no small measure due to his careful attention to details. I wish also to mention the kind assistance and courtesies received through the personnel of the office of the Carnegie Institution in Guatemala City. The assistance rendered by Sr. Adolfo Molina was especially valuable.

J. W. GREEN, ON MAGNETIC WORK IN WEST INDIES, SOUTH AMERICA, AND CENTRAL AMERICA AUGUST, 1931, TO JUNE, 1932

I left Washington on the evening of August 3, 1931, en route to New York. In New York, I was joined by observer Earl Hanson.

My instrumental equipment consisted of magnetometer inductor No. 26 complete in instrument case and with tripods, tent No. 59 with canopy top, pocket chronometer No. 50098, Howard watches Nos. 811 and 813, and the usual supply of field-forms, computing tables, etc.

I left New York in company with Mr. Hanson August 5, bound for Havana, Cuba, which port was reached on the morning of August 8.

At Havana there were the usual formalities about the entry of our instrumental outfits. Unfortunately, a bit of a revolution was being staged in Cuba at the time, and the entire island was under military control. It was necessary for us to register at military headquarters and to secure military permits to carry out the desired observations, as well as for moving about from place to place. Under such circumstances, it was inevitable that delays should occur, but the military authorities readily granted permits with a minimum of delay.

This being Mr. Hanson's first experience in fieldwork, he was to remain with me until such time as he had become sufficiently familiar with the technique of handling field instruments and with the routine of field observations and was capable of proceeding alone. At station A, Havana, he looked on and recorded for me. When I moved to station B, he set up his instrument at station A and secured some practice sets. Having completed the work at Havana, a side trip to Pinar del Rio was made, where an approximate reoccupation of the station of 1922 was secured, Mr. Hanson continuing with practice observations. Returning to Havana after completing the work at Pinar del Rio, we left again the following day for Santiago, Cuba, making observations at Matanzas en route, and arrived at Santiago on August 20. Here an approximate reoccupation of the station of 1922 was secured and a new station established about five miles distant from the old location. Mr. Hanson continued practice observations the first day; and the second day, working without supervision, since I was engaged at the new station five miles distant, he made a complete series of magnetic observations. The observational work at Santiago was completed on August 24.

Leaving Santiago on August 29, we arrived at Kingston, Sunday, August 30. After a day spent in visiting officials and owners of property where the station was located, I proceeded with the observational work while Mr. Hanson was sent to Montego Bay at the other end of the island to reoccupy the station there. The work at Kingston having been completed and Mr. Hanson having returned from Montego Bay on September 10, we took passage on a German freighter for Santo Domingo en route to San Juan, Porto Rico. On this journey we narrowly missed one of the West Indian hurricanes, its center traveling slowly westward just off the north coast of Santo Domingo while we were traveling eastward along the south coast. The wind reached almost gale proportions during the night, but beyond getting a bit wet from the rain that drove through every crack and crevice around door and window, we suffered no discomfort, and the wind abated early next morning. We transferred to a small passenger vessel at Santo Domingo after spending a night there, arriving at San Juan on September 15.

After a conference with Commander E. R. Hand, observer-in-charge of the San Juan Magnetic Observatory, preparations were made for the intercomparison of field magnetometer No. 26 with the observatory standard, this work being carried out during the ensuing ten days. Having completed this work, in which Mr. Hanson took an active part, I considered that he had progressed far enough to be able to carry on without supervision, and we, therefore, separated. Mr. Hanson sailed September 29 for La Guira, Venezuela, and I left on October 1 bound for Port of Spain, Trinidad.

Table 15 shows the stations occupied by both observers in Cuba, Jamaica, and Porto Rico, the dates of occupation, and the geographical positions.

I had left San Juan, Porto Rico, on the French steamer Antilles, transferring at Fort de France to the Saint Rafael, which made a round trip once each four weeks between Fort de France and Cayenne, French Guiana. I arrived at Port of Spain on October 8. The rainy season had begun and I was delayed here somewhat on that account. However, during the following ten days I succeeded in getting repeat-observations and exact reoccupations, at the two stations at Port of Spain, and a series of diurnal variations in each of the three elements, repeat-observations, and an exact reoccupation, at San Fernando 40 miles distant from Port of Spain. One day was spent in company with Mr. Dumonoire of the Crown Surveyor's Office in making determinations of declination only at five quite widely-separated points over the island for the purpose of checking the declination differentials which they have determined and are accustomed to using in their land surveys.

On October 19, I took passage for Barbados, arriving at Bridgetown early in the morning of October 20. The old stations A and B were found intact and exact reoccupations were secured, as well as a full series of observations on the opposite side of the island at Bathsheba.

The return trip to Port of Spain was accomplished with little delay, and I arrived there Saturday morning, October 24, where I visited the Office of the Crown Surveyor. I sailed from Port of Spain on October 27 for Georgetown, British Guiana.

Arriving in Georgetown early in the morning, October 29, I succeeded in getting the necessary permit in time to get in almost a full day's work that day, occupying station B, and on the following day a complete reoccupation of station A, both exact reoccupations. The next morning, October, 31, I embarked on a small government-operated vessel for Bartica, arriving at my

Table 15

No.	Station	Date	Latitude	Longitude East
		1931	° ′	° ′
1	Havana, Casa Blanca, A, Cuba	Aug 10, 11	23 09.4 N	277 39
2	Havana, Casa Blanca, B, Cuba	Aug 11	23 09.4 N	277 39
3	Pinar del Rio, Cuba	Aug 15, 16	22 25.0 N	276 18
4	Matanzas, Cuba	Aug 19	23 03.5 N	278 26
5	Santiago, A, Cuba	Aug 22	20 00.5 N	284 12
6	Santiago, B, Cuba	Aug 24	20 02.6 N	284 13
7	Kingston, A, Jamaica	Sep 3	17 58.9 N	283 11
8	Kingston, B, Jamaica	Sep 4- 7	18 05.3 N	283 12
9	Kingston, C, Jamaica	Sep 8	17 58.7 N	283 16
10	San Juan Observatory, Porto Rico	Sep 19-29	18 23 N	293 53
11	Port of Spain, A, British West Indies	Oct 10	10 40.0 N	298 29
12	Port of Spain, B, British West Indies	Oct 13	10 40.0 N	298 29
13	San Fernando, British West Indies	Oct 16	10 16.8 N	298 32
14	Bridgetown, A, British West Indies	Oct 20, 21	13 04.8 N	300 25
15	Bridgetown, B, British West Indies	Oct 20, 21	13 04.8 N	300 25
16	Bathsheba, British West Indies	Oct 22	13 12.3 N	300 29
17	Georgetown, B, Guiana	Oct 29	6 48.8 N	301 51
18	Georgetown, A, Guiana	Oct 30	6 48.8 N	301 51
19	Bartica, Guiana	Nov 1	6 25.0 N	301 22
20	Paramaribo, Guiana	Nov 5, 6	5 50.0 N	304 52
21	Cayenne, A, Guiana	Nov 12	4 56.1 N	307 41
22	Cayenne, C, Guiana	Nov 12, 13	4 56.1 N	307 41
23	Clevelandia, Brazil	Nov 16	3 49.0 N	308 09
24	Pinheiro, Brazil	Dec 3, 4	1 17.9 S	311 32
25	Natal, Brazil	Dec 12	5 46.7 S	324 49
26	Pernambuco, B, Brazil	Dec 18	8 04.9 S	325 07
27	Pernambuco, C, Brazil	Dec 19	8 03.8 S	325 08
28	Pernambuco, A, Brazil	Dec 21	8 06.8 S	325 06
29	Bahia, A, Brazil	Dec 27	13 00.2 S	321 29
30	Bahia, B, Brazil	Dec 28, 29	13 00.2 S	321 29
		1932		
31	Vassouras, Brazil	Jan 7, 9	22 24.0 S	316 21
32	Colon, A, Uruguay	Feb 2	34 48.3 S	303 44
33	Colon, B, Uruguay	Feb 2, 3	34 48.3 S	303 44
34	Mercedes, Argentina	Feb 12	34 39.6 S	300 31
35	Bahia Blanca, A, Argentina	Feb 17	38 43.7 S	297 48
36	Bahia Blanca, B, Argentina	Feb 18	38 46.4 S	297 43
37	Pilar, Argentina	Feb 29-Mar 3	31 40.1 S	296 07
38	La Quiaca, Argentina	Mar 7, 9	22 06.6 S	294 25
39	Pilar, Argentina	Mar 12, 16	31 40.1 S	296 07
40	Mendoza, A, Argentina	Mar 21	32 52.5 S	291 09
41	Mendoza, C, Argentina	Mar 22	32 54.1 S	291 09
42	Santiago, A, Chile	Mar 29	33 27.0 S	289 18
43	Santiago, B, Chile	Mar 31	33 27.0 S	289 19
44	Valparaiso, B, Chile	Apr 8	33 04.4 S	288 23
45	Valparaiso, A, Chile	Apr 9	33 04.4 S	288 23
46	Antofagasta, Chile	Apr 19	23 42.2 S	289 42
47	Arica, Chile	Apr 23, 24	18 30.4 S	289 42
48	La Paz, A, Bolivia	Apr 28, 29	16 30.5 S	291 50
49	La Paz, B, Bolivia	Apr 28, 29	16 31.2 S	291 49
50	Juliaca, A, Peru	May 4, 5	15 30.0 S	289 52
51	Juliaca, B, Peru	May 4, 5	15 30.0 S	289 52
52	Arequipa, B, Peru	May 9	16 22.5 S	288 27
53	Arequipa, C, Peru	May 10, 12	16 24.7 S	288 27
54	Huancayo, E_m and W_m	May 23, 26	12 02.7 S	284 40
55	Corozal, B, Canal Zone	Jun 7	8 58.4 N	280 26
56	Old Panama, A, Canal Zone	Jun 8	9 00.2 N	280 31
57	Sweetwater	Jun 10	9 21.3 N	280 03
58	Washington Hotel	Jun 11	9 22.0 N	280 05

destination about 7:00 P.M. A close reoccupation of the station of 1923 with a complete series of observations was made Sunday, November 1. On Monday, November 2, I returned to Georgetown. A vessel of the Royal Netherlands Line leaving Georgetown on November 3 landed me in Paramaribo on November 4 toward evening, where I observed on November 5 and 6. It was carrying a party of officials, and stops were made at St. Laurent and at

Isle Royale so that these officials might inspect the prisons at those points. We reached Cayenne toward evening, November 10. At the customs house I was informed that it would be necessary for my instrumental outfit to be passed upon by the chief inspector, who had left the office for the day when I arrived. After inquiring what time the office would be open next morning, I was told that the next day was a holiday and that the office would not be open again until the day after. I was somewhat disturbed by this announcement, as I had been informed that the small French coastal steamer would leave on November 14 for the Oyapock River, which forms the boundary between French Guiana and Brazil. In order to complete my observations at Cayenne in time to sail on this vessel, it would be necessary for me to get started at the work as soon as possible. At Georgetown, British Guiana, the American vice-consul had given me the name of S. M. Filipovich in Cayenne as being a man who might be able to assist me in case of any difficulty. Upon presenting myself at his office-residence and explaining the situation concerning my instrument, he told me to "think no more about it" and added "you will have your instrument tomorrow morning." True to his word, almost before I had finished my breakfast next morning, he had the instrument delivered at the hotel. I was able to secure the necessary permit and to begin observations just after noon, November 11. Observational work was continued throughout November 12 and 13. An exact reoccupation of station A was made. A new station C was located nearby, but on the opposite side of station A from the old station B of 1923, in order to test for local attraction, which was quite marked in this locality. The coastal steamer left Cayenne on the afternoon of November 14. The vessel was very small and "passage" only was sold. No meals were served on the vessel, and food and drinking water had to be supplied by the passenger. There were a few berths, but they were below deck and next to the boiler room. I had provided myself with a steamer chair, and I spent the night on the deck in this chair. We arrived at the village of St. Georges on the Oyapock River about noon, November 15. I had met a Brazilian gentleman, a Senhor Fernando de Araujo, also on his way to Para, and we started to look for a place to spend the night. Senhor Araujo had been in St. Georges before and had acquaintances there, but none of them seemed to be so situated that they were able to accommodate us. During the afternoon we were invited to join a small party taking a launch trip up the river to Clevelandia, a government settlement about eight miles from St. Georges, on the Brazilian side of the river. This settlement had been in operation some time and in 1927 the Brazilian Boundary Commission under Capitan Roudon established a well-marked longitude station. The officials of the colony, upon being informed of the nature of the work I was carrying on gave me a most urgent invitation to make a series of observations at that point. As I had one day to wait, I readily agreed to make observations there, especially when the officials offered to furnish transportation for myself and outfit from St. Georges to Clevelandia and return.

The launch party returned to St. Georges, and Senhor Araujo and I, having been unable to find quarters for the night, returned to the French steamer, where I spent a second night in my chair on the deck. True to their promise, the Clevelandia officials had a launch waiting for me at the wharf at 7:00 A.M. next morning. I had suggested that 7:30 would be a convenient time to start.

The trip to Clevelandia and return was uneventful. A full series of observations was secured and altogether it was a very enjoyable day, especially the noon-hour when I was provided with a very excellent chicken dinner.

Upon returning to St. Georges toward evening, we found that the French steamer had departed on the return voyage, but that the Brazilian steamer had arrived and was at the small wharf across the river at the village of St. Andrews. After procuring dinner at St. Georges, I bargained for the services of a boatman who rowed across the river, where I secured permission to sleep in my chair on the deck of the Brazilian steamer, the cabins not having been cleaned up after the former occupants had vacated them. The next morning I returned to St. Georges, got my baggage and outfit together, and had it transferred across the river to the Brazilian steamer. Long before the vessel was scheduled to leave, Senhor Araujo and I had been assigned to a cabin, and had seen that our baggage was properly stowed on the deck. I felt that at last I was fairly on my way to Para.

The trip from the Oyapock River to Para was monotonously slow. The weather was hot and humid. The small steamer which made the trip between Para and the Oyapock River stopped at every village and hamlet throughout the delta of the Amazon. We left St. Andrews on the Oyapock at noon, November 17, and arrived in Para on the morning of November 23, having taken six days for a journey that travelers by the air route cover in five hours.

At Para I encountered the only difficulty of the entire trip with customs officials. A zealous chief inspector held my instrumental outfit for payment of duty. The intercession of the American consul and a detailed explanation of the nature of my mission availed nothing. It was necessary to send telegrams to the American Ambassador in Rio de Janeiro and through that official to secure from the minister of finance an exemption-order. Even after the exemption-order was in the hands of the chief inspector, it took the American consul and myself from 9:00 A.M. until 3:30 P.M. to secure possession of the instrument.

In this connection, I wish to pay tribute to the United States Consular Service throughout South America. The consuls, vice-consuls, and consular clerks were one and all helpful in the matter of securing official permission for my observational work, information concerning boats, mails, etc., as well as being able to give me information concerning possible station sites whenever I found it necessary to establish a new station.

During the interval of waiting for my instrument in Para, I had completed and forwarded to the office all field-records to date. It was December 2 when I finally secured delivery of my instrument, and I spent the next two days observing at Pinheiro, where an exact reoccupation was made.

I then secured passage on a Brazilian steamer for Natal, Brazil, leaving Para late in the evening of December 5. I arrived in Natal on the morning of December 10, and after a day spent in the usual formalities, a complete series of observations with double sets of magnetic work were made. The old station was no longer available here and the observations were made about three-fourths of a mile north of the old location.

Upon inquiring about transportation, I found that there would be no vessel for Pernambuco until December 17. The weekly train, a combination affair ("combination" meaning first- and second-class passengers, in addition to express and freight), would be leaving Natal at 4:30

A.M., December 15, arriving in Pernambuco about 9:30 P.M. the same day.

At Pernambuco it was necessary to abandon the old stations, both A and B. An electric carline passed almost directly over station A, and the same line passed within three or four hundred feet of station B. A series of observations was made on the grounds of the Jockey Club about one mile west of former station A, this being the place nearest the old station where observations might be made without too much danger of artificial disturbance. I then went about five miles west of the old stations to the government-owned Zeppelin field and established a new station. Though the spot selected here was about three-fourths of a mile from an electric carline, it was somewhat disturbed. I then selected another site at the landing field of the Aeropostale Company, about eight miles southwest from the city, where after making the regular series of observations, diurnal-variation series for each of the three elements were made.

Since inquiries had been previously made concerning steamer service from Pernambuco to Bahia, I learned that a Royal Netherlands Line vessel, the Flandria, would leave Pernambuco about noon, December 24. Upon returning to the hotel in the evening of December 23, having just completed the diurnal-variation work mentioned above, I was met with the information that the Flandria would be in at daylight next morning and leave at 9:00 A.M. I spent Christmas eve and most of Christmas day on this not large but well-appointed vessel of the Royal Netherlands Line.

I arrived in Bahia toward evening, December 25. The following day I looked up the stations I had established there in 1923, and the surroundings were found to be unchanged. During the next four days regular observations were made at each of the two stations A and B. In addition, diurnal-variation observations in each of the three elements were made at station B, which was considered the more suitable of the two for that purpose. The observational work at Bahia was completed December 30.

I arrived by steamer in Rio de Janeiro on January 3. My work there was twofold, namely, to secure an intercomparison of my field-instrument with the standard observatory instruments of the Vassouras Magnetic Observatory at Vassouras, about 140 kilometers north of the city, and to confer with Dr. Alix Lemos, chief of the magnetic section of the National Observatory of Brazil, and Dr. Raul Pires Xavier, Acting Director, Brazilian Meteorological Institute, concerning the proposed participation of Brazil in the polar year work. On the following day I saw Dr. Lemos at the National Observatory. It was arranged that I should proceed to Vassouras on January 6. The National Observatory, through the Department of Terrestrial Magnetism, had recently purchased from the Precise Instrument Company, of Brooklyn, two CIW type field magnetometer inductors. In addition to the intercomparison of my magnetometer inductor No. 26 with their observatory instruments, Dr. Lemos wished to have intercomparisons of the observatory instruments with each of these new instruments and wished me to handle the new instruments as I was familiar with the type. While at the observatory I also met and talked with Dr. Sodre da Gama, Director of the National Observatory of Brazil.

On January 6, I proceeded by train to Vassouras, Dr. Lemos sending along a man from the National Observatory to look after the two new magnetometer inductors which were being shipped to Vassouras by express on the same train. The necessary observations for the comparison of magnetometer No. 26 took up three full days, after which each of their new instruments, Nos. 109 and 110, was compared in turn. On completing intercomparisons, I remained a few days longer, discussing the use of the new type of magnetometer and earth inductor.

I left Rio de Janeiro on January 28 and arrived in Montevideo, Uruguay, on the morning of February 1. Upon presenting my letter of introduction and special passport to the immigration and customs authorities, my baggage and outfit were at once passed without inspection, one of the customs inspectors also going to the trouble of securing a taxicab for me and making arrangements for the transfer of my baggage to the hotel.

The magnetic stations here are on the grounds of the Colegio Pio, about 18 kilometers northwest of the city. I was given every possible assistance by the "Fathers" at this institution and their astronomical observatory was placed at my disposal as a safe place to store my outfit overnight during the three days I was observing there. A close reoccupation of station A and an exact reoccupation of station B were made. On January 5 I called upon Senor Coronel Juan de Sicco, Servicio Geografico Militar, who received me very cordially and took me out to visit their hydrographic vessel, which was very well equipped with modern apparatus for various kinds of hydrographic work. The officers of this vessel were very much interested in terrestrial magnetism and expressed their regret that they had neither equipment nor facilities for magnetic work.

I sailed from Montevideo late in the evening of February 5, arriving in Buenos Aires the next morning, where again I was shown every consideration by the immigration authorities and customs officials.

I had arrived in Buenos Aires at a rather inopportune time. It was Saturday morning and by the time I reached a hotel with my baggage and outfit, paid a visit to the bank for some Argentine exchange, looked up the American consulate, and inquired for my mail, it was noon, and all business is suspended at noon on Saturday in Buenos Aires. The following Monday and Tuesday, February 8 and 9, were holidays--a sort of annual festival.

I left Buenos Aires on February 11 for a short side-trip to Mercedes, 98 kilometers from Buenos Aires, returning on February 13. Having to make a second side trip from Buenos Aires, I again left the city on February 14, bound for Bahia Blanca, arriving at the latter place next morning.

On account of recent heavy rains and the fact that the former stations were on low flat land, I found upon visiting the site of Bahia Blanca that the stations, both A and B, were under water. I, therefore, looked for a new site and a fairly good one was found at the airport of the Aeroposte Nacional, about ten kilometers nearly east from the city and about the same distance northeast of the old location. After securing a double series of observations at this location, I returned to the old stations where I succeeded in making a close reoccupation of former station B, the water having subsided to the extent that a nearly dry spot was found near the former site.

Returning to Buenos Aires on February 20, I succeeded in meeting Senor Martin Gil, Director of the Meteorological Service, the vice-director, and Mr. Olaf Lutzow-Holm, chief of the magnetic section, who had just returned from an inspection trip to the South Orkneys where he had gone with supplies and two exchange observers for their magnetic observatory at that place. I found these gentlemen very much interested in terrestrial magnetism, especially the vice-director and Mr. Lutzow-Holm. They plan to carry out the magnetic survey of Argentina as soon as the necessary funds can be obtained. As my next work was to be an intercomparison of instruments between my field magnetometer inductor and the Argentine standard at Pilar Observatory, and as Mr. Lutzow-Holm informed me that it would not be convenient for them to begin intercomparisons until he himself returned to the observatory, I decided to wait the two or three days it would be necessary for him to remain in Buenos Aires and then proceed to the Pilar Observatory in company with him. During the interval I visited the Instituto Geografico Militar. Unfortunately, the Director of the Institute, Senor Felix Aguilar, was out of the city, but I met and talked with Mr. Floris Jansen of the section of geodesy, and Messrs. Luciano Rafael and Adolfo Hart-Kopf, both of the section of geodesy. At the time I visited the institute, I found Messrs. Rafael and Kopf engaged in remodeling a magnetometer to suit their needs and adapt it for field use. They are planning to do some magnetic work in connection with their geodetic work. The enthusiasm of these gentlemen for their work under the adverse condition of having no specific allotment for the purpose was highly encouraging.

On February 27, I left Buenos Aires in company with Mr. Lutzow-Holm, and we arrived in Pilar early next morning. No work was done on Sunday, February 28, with the exception of setting up my instrument and suspending the torsion-weight preparatory to beginning intercomparison observations next morning.

The Meteorological Service of Argentina had, through the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, purchased from the Precise Instrument Company, two magnetometer inductors of the CIW type. In addition to the intercomparison of their Kew magnetometer No. 175 with my instrument No. 26, Mr. Lutzow-Holm wished to compare one of their new magnetometers with No. 26 and to make some test observations with the second instrument to make sure it was in working order. The intercomparison observations were begun Monday morning, February 29. The comparison between Kew No. 175 and CIW No. 26 was completed on March 3, and a beginning made with No. 26 and CIW No. 105.

It was desired also that an intercomparison be obtained between No. 26 and the observatory instrument at La Quiaca, Kew instrument No. 138. In order to make the most advantageous rail connections for the trip to La Quiaca and return, I left Pilar in the afternoon of March 4, arriving at La Quiaca about 11:00 P.M. on March 6. During the following three days a complete series of intercomparison observations was made between CIW No. 26 and Kew No. 138, the La Quiaca Observatory instrument. This intercomparison was carried out with exchange of stations, which had been found impossible at previous intercomparisons on account of the high winds prevailing in this locality during a large part of the year, and it was impracticable to try to use Kew magnetometer No. 138 in a tent when the wind was blowing strongly.

This work was completed toward evening of March 9, and at 8:30 P.M. I boarded a train for the return trip to Pilar, where I arrived on the afternoon of March 11. On the following day the intercomparison of Nos. 26 and 105 was resumed, and was completed on March 14. The next two days were utilized in making one complete double set of simultaneous observations using No. 26 and the second CIW type instrument No. 102, and in computing, checking, and tabulating the results of the intercomparison of No. 26 with No. 175 and No. 105. I left Pilar on March 17 and arrived in Mendoza the next day. Five days were spent in Mendoza, where two stations, about a half-mile apart, were occupied, one of them being a close reoccupation of station A of 1925. Leaving Mendoza toward evening of March 23, I reached Santiago, Chile, the next evening. The following day was Good Friday and all public offices were closed on this day as well as on the Saturday and Sunday following, and I was unable to obtain permission to reoccupy our old station, which was located in a city park. However, I found the officials most courteous and helpful when I called upon them on Monday morning, March 28. I found Senor J. Valensuela, Chief of the Meteorological Service of Chile, and his technical assistant, Senor J. Waldo Nuno, very much interested in terrestrial magnetism and very much pleased that I had happened along at this particular time. Some time previously they had purchased a Kew magnetometer. They had had constructed a small, supposedly nonmagnetic building, with suitable piers for instruments. Since they had no trained observer, observations for declination had been attempted by one of the assistants in the Meteorological Office. He had used a solar attachment of the Kew instrument for the determination of azimuth. The results that had been obtained at their station differed greatly from the values indicated for that locality by existing charts, and they were unable to account for the difference.

After making a series of observations at our CIW station, which was about one-fourth of a mile north of the Meteorological Office, I established a second station in the yard of the Meteorological Office, about 70 feet south of the magnetometer pier of their station. Comparing my results at this station with the values obtained by their observer, it was found that there was a difference of something over a degree. Observations with magnetometer No. 26 on their pier indicated a probable error in the azimuth they were using. A series of azimuth observations with my instrument revealed an error of about 53 minutes in the azimuth they were using. After he received a little instruction and practice, their observer and myself were able to make a series of simultaneous observations with exchange of stations. The results indicated a station difference of 6′.0 and an instrumental correction of 0′.6. These corrections, together with the application of the axis correction of the magnet which had not previously been applied, accounted for the large error which had been apparent in their results previously obtained, and they were then able to obtain results agreeing very closely with the values I obtained near their station. Senor Valensuela and Senor Nuno were highly gratified, and I felt that the time consumed had been well worth while.

I left Santiago on April 7, arriving in Valparaiso the same afternoon, where exact reoccupations of the two stations of 1925 were made. While in Valparaiso I took occasion to call upon the official in charge of the Valparaiso meteorological station. I also went to the Department of Navigation and Hydrography, where I met and talked with Capitan Alfredo Novion Valck, the official in charge of the office.

On April 15, I proceeded to Antofagasta, at which place the former station was found to be unavailable and a new station was located some 10 or 12 miles southeast of the former location. Arica, the last of my stations in Chile was occupied on April 23 and 24.

At these last two stations, as an evidence of Senor Valensuela's interest and helpful forethought, I was met, upon the arrival of the vessel in the harbor at each place, by the chief of the customs service and was personally conducted ashore and through the customs house.

From Arica my route took me inland again to Bolivia. Leaving Arica on the evening of April 25, I arrived in La Paz late in the afternoon of the following day, where I made exact reoccupations of the two stations at Alta de La Paz, which were something over 13,000 feet above sea level.

While in La Paz I called upon Father Descotes at the Colegio San Calixto, who was able to supply me with a very reliable time-comparison for my chronometer, and we discussed the possibility of some co-operative magnetic work.

I left La Paz on May 3 and arrived in Juliaca, Peru, the next morning, having crossed Lake Titicaca during the night. No difficulty was encountered with the Peruvian customs and immigration officials, and two days later I had completed exact reoccupations of the two stations located there. Leaving Juliaca on the morning of May 7, I reached Arequipa the same evening. After an exact reoccupation of station B at Arequipa, a new station was established about two miles south of the old station, where, after a complete regular series of observations, a series for diurnal variation in each of the three elements was made.

Leaving Arequipa on the morning of May 14, I reached Mollendo about noon and embarked for Callao the same evening, arriving at the latter place on the morning of May 18. I reached the Huancayo Magnetic Observatory on May 20. A complete series of intercomparison observations with exchange of stations was made between magnetometer No. 26 and the observatory standard, and all computations were completed and checked before I took my departure on May 28.

Leaving Callao on June 1, I arrived at Balboa and Panama City on June 6. Some very much appreciated assistance was given me by various Canal Zone officials, and I secured exact reoccupations of two stations at the Pacific end of the Canal Zone--one at Corozal, the other at Old Panama.

On June 9, I crossed by train to Cristobal at the Atlantic end of the Canal Zone. Zone officials here also rendered me every assistance possible, and the reoccupations of stations at Sweetwater Inlet and near the grounds of the Washington Hotel were made on June 10 and 11.

I took passage for New York on a vessel of the Panama Pacific Line, sailing from Cristobal on June 14. I arrived in New York on June 20, reached Washington toward evening of the same day, and reported at the office the next morning, June 21.

Fifty-eight stations were occupied in 36 localities. Of these stations, five, namely, San Juan, Porto Rico; Vassouras, Brazil; Pilar and La Quiaca in Argentina; and Huancayo, Peru, were observatory intercomparisons, consisting of simultaneous observations with exchange of stations; intercomparison was also made at Santiago, Chile. In addition, at Vassouras, Brazil, there were three complete instrumental comparisons; and at Pilar, Argentina, two intercomparisons were made, a complete series with exchange of stations for each instrument. Of the remaining stations, four, namely, Port of Spain, Trinidad; Pernambuco and Bahia, Brazil; and Arequipa, Peru, were Class I stations, with diurnal-variation series in each of the three elements being made. At a large percentage of all other stations double series of magnetic observations were made.

I had been absent from Washington ten and a half months. The total distance traveled was 19,964 miles, not counting local travel, of which 12,849 miles were by steamship, 6,451 by railways, and 364 by automobile.

E. N. GRINDLEY, ON MAGNETIC WORK IN AFRICA, DECEMBER, 1927, TO JULY, 1930

My equipment consisted of CIW magnetometer No. 13, Reid chronometer No. 1078, Dent chronometer No. 58821, and tent.

Table 16 lists the stations occupied and their positions.

The present narrative begins with the work of January and February, 1928. At Matjesfontein Beattie's old station could not be exactly located; the large tree referred to in his description has disappeared. However, judging from his description and that of Mr. J. D. Logan, a resident who remembered Beattie's visits, my station was probably within 50 meters or so of the old one.

Work was delayed several times by overcast sky at noon, electrification of the tent by dust on one occasion, and at another time by thunderclouds.

An auxiliary station was chosen about 400 meters to the west of the main station and was marked by a standing stone.

At Beaufort West, a position was chosen to the left of the present road to Lemoenfontein and to the north of the railway line. I consider it probable that I was about 300 meters from Beattie's station, (although it might have been 1 or 2 kilometers).

At Hutchinson, the reoccupation was closer, probably about 25 meters. Dip measurements could be taken only in the early morning because of electrification of the tent. After a rain one day a midday reading was taken. The auxiliary station was chosen about 1 kilometer from the other; both stations were marked, the former by a concrete block, the latter by a cairn.

Beattie's station at De Aar was on a tract of land that had since been built up--a house every hundred yards or so, each with at least one large iron wind pump. A new site was therefore selected, about 0.5 kilometer further south.

The station at Orange River was probably 200 meters north of Beattie's 1902 station. My auxiliary station was about 200 meters south of Beattie's site. The principal station was marked by a cairn placed over a surface stone suitably marked.

The weather conditions here seemed to be typical of the Karroo in summer. In the early morning, there was a light breeze from the southeast which followed the Sun around and increased in strength throughout the day. By nine or ten o'clock in the morning, it was usually sufficient to cause considerable electrification of the tent,

Table 16

No.	Station	Date	Latitude		Longitude East	
		1927	°	′	°	′
1	Capetown, E, Union of South Africa	Dec 7-10, 26	33	56.0 S	18	29
2	Capetown, F, Union of South Africa	Dec 8, 21, 22, 26	33	56.0 S	18	29
3	Matjesfontein, A, Union of South Africa	Dec 31	33	14.5 S	20	35
		1928				
4	Matjesfontein, B, Union of South Africa	Jan 3- 5	33	14.6 S	20	35
5	Matjesfontein, A, Union of South Africa	Jan 5	33	14.5 S	20	35
6	Beaufort West, Union of South Africa	Jan 7	32	21.0 S	22	36
7	Hutchinson, A, Union of South Africa	Jan 9-11	31	29.8 S	23	13
8	Hutchinson, B, Union of South Africa	Jan 12	31	29.5 S	23	12
9	De Aar, Union of South Africa	Jan 14	30	40.4 S	24	00
10	Orange River, A, Union of South Africa	Jan 16-22	29	40.0 S	24	12
11	Orange River, B, Union of South Africa	Jan 21	29	40.3 S	24	12
12	Bloemfontein, A, B, Union of South Africa	Jan 25-27	29	07.2 S	26	12
13	Karree, A, Union of South Africa	Jan 30, 31	28	52.6 S	26	21
14	Karree, B, Union of South Africa	Jan 31, Feb 2	28	52.7 S	26	21
15	Springfontein, Union of South Africa	Feb 3, 4	30	16.8 S	25	43
16	Queenstown, Union of South Africa	Feb 6	31	54.5 S	26	51
17	East London, A, Union of South Africa	Feb 8-11	33	00.3 S	27	56
18	East London, B, Union of South Africa	Feb 12	33	00.0 S	27	56
19	Cradock, Union of South Africa	Feb 16	32	10.2 S	25	37
20	Uitenhage, Union of South Africa	Feb 25-27	33	46.6 S	25	23
21	Willowmore, Union of South Africa	Feb 28, 29	33	18.0 S	23	28
22	Mossel Bay, Union of South Africa	Mar 1, 2	34	11 S	22	08
23	Durban (The Bluff), Union of South Africa	Jul 2, 5	29	52.6 S	31	03
24	Mooi River, Union of South Africa	Jul 7, 8	29	13.1 S	30	00
25	Bethlehem, A, Union of South Africa	Jul 9, 10	28	14.0 S	28	17
26	Bethlehem, B, Union of South Africa	Jul 11	28	14.3 S	28	18
27	Gingindhlovu, A, B, Union of South Africa	Jul 13-16	29	02.0 S	31	35
28	Buffel's Bay, Union of South Africa	Nov 6- 8	34	19.2 S	18	28
29	Windhoek, A, South-West Africa	Dec 22-27	22	32.5 S	17	05
30	Windhoek, B, South-West Africa	Dec 27, 28	22	32.5 S	17	04
31	Kalkfeld, A, South-West Africa	Dec 31	20	53.4 S	16	13
		1929				
32	Kalkfeld, A, B, South-West Africa	Jan 1	20	53.4 S	16	13
33	Otavi, South-West Africa	Jan 2, 3	19	38.2 S	17	28
34	Tsumeb, South-West Africa	Jan 5	19	14.5 S	17	43
35	Swakopmund, A, South-West Africa	Jan 16, 17	22	41.0 S	14	32
36	Swakopmund, B, South-West Africa	Jan 17	22	41.0 S	14	32
37	Karibib, South-West Africa	Jan 24, 25	21	56.2 S	15	51
38	Gibeon, South-West Africa	Jan 27, 28	25	07.2 S	17	42
39	Mount Brukkaros, A, South-West Africa	Jan 31-Feb 3	25	51.2 S	17	48
40	Mount Brukkaros, B, South-West Africa	Feb 4	25	51.2 S	17	48
41	Keetmanshoop, South-West Africa	Feb 8, 9	26	34.7 S	18	04
42	Luderitzbucht, South-West Africa	Feb 11, 12	26	39.4 S	15	09
43	Aus, A, South-West Africa	Feb 15, 16	26	40.2 S	16	16
44	Aus, B, South-West Africa	Feb 16, 17	26	40.3 S	16	16
45	Seeheim, South-West Africa	Feb 18, 19	26	48.5 S	17	48
		1930				
46	Buffel's Bay, Union of South Africa	Feb 11-14	34	19.2 S	18	28
47	Eendekuil, Union of South Africa	Feb 19	32	41.2 S	18	52
48	Van Rhynsdorp, Union of South Africa	Feb 20, 21	31	37.5 S	18	44
49	Wolseley, Union of South Africa	Feb 23, 24	33	25.2 S	19	12
50	Matjesfontein, A, Union of South Africa	May 31	33	14.5 S	20	35
51	Potgietersrust, A, Union of South Africa	Jun 3, 4	24	11.0 S	29	01
52	Potgietersrust, B, Union of South Africa	Jun 4- 6	24	11.0 S	29	01
53	Pretoria, Union of South Africa	Jun 7, 8	25	45.0 S	28	10
54	Machadodorp, Union of South Africa	Jun 10, 11	25	39.9 S	30	15
55	Lourenço Marques, A, Portuguese East Africa	Jun 13, 18	25	58.1 S	32	36
56	Matola, Portuguese East Africa	Jun 14	25	58.7 S	32	30
57	Boane, Portuguese East Africa	Jun 15	26	02.5 S	32	20
58	Pessene, Portuguese East Africa	Jun 16	25	41.5 S	32	21
59	Beira, B, Portuguese East Africa	Jun 21	19	49.9 S	34	50
60	Beira, C, Portuguese East Africa	Jun 22	19	49.8 S	34	51
61	Umtali, Southern Rhodesia	Jun 25	18	59.4 S	32	43
62	Salisbury, A, Southern Rhodesia	Jun 28	17	49.5 S	31	03
63	Salisbury, B, Southern Rhodesia	Jul 1	17	48.2 S	31	04
64	Salisbury, C, Southern Rhodesia	Jul 2	17	50.4 S	31	04

Table 16--concluded

No.	Station	Date	Latitude	Longitude East
		1930	° ′	° ′
65	Hartley, A, Southern Rhodesia	Jul 3- 5	18 08.5 S	30 09
66	Hartley, B, Southern Rhodesia	Jul 6	18 08.6 S	30 09
67	Bulawayo, Southern Rhodesia	Jul 8, 9	20 09.0 S	28 36
68	Victoria Falls, Southern Rhodesia	Jul 11-15	17 55.9 S	25 51
69	Mafeking, Union of South Africa	Jul 18-20	25 51.8 S	25 39
70	Warrenton, Union of South Africa	Jul 21	28 07.1 S	24 53
		1933		
71	Matjesfontein, A, Union of South Africa	Jan 24, 25	33 14.5 S	20 35
72	Wolseley, Union of South Africa	Jan 26, 27	33 25.2 S	19 12

either by dust or by causing friction between tent, canopy, and guy ropes. By noon, it was blowing from the north with such strength as to make the tent feel unsafe, and it continued in intermittent gusts of gale strength throughout the afternoon, from the northwest and west. It died away about sunset, usually too late for one to take advantage of the calm period that followed, when the light failed rapidly. During the night the wind was usually from the south and very light.

Orange River was chosen for observations of diurnal variation. During the afternoon, the heat became unbearable when the tent was open on the lee side, and the instrument became very unsteady when it was open on the windward side. Some time was wasted making the adjustments to the tent, and the readings actually taken fluctuate rather badly. I finally decided to endure the heat with the lee side open and continued to take the readings until the maximum of westerly declination had been passed; but I was too tired to continue until 18h LMT as instructed.

Because of weather conditions, I decided that diurnal variation observations for dip were out of the question, and therefore did not attempt them.

Mr. Sawyer's sketch map enabled me to choose a spot probably within one meter of his old one at Bloemfontein. The site was not ideal from the magnetic point of view, as it was only about 40 meters from an iron pipe line, and 10 meters from a road where bicycles and occasional motors passed. I tested the declination at another point, 50 meters further from the pipe line, and got good agreement.

The shade from the trees and the lack of wind and dust made the station a suitable one for diurnal observations of dip, which I accordingly carried out.

At Karree, the enlargement of the railway station had removed the Dead End from which Beattie measured the distance to his station. One ganger there could remember its existence, but the exact position was in doubt to about 10 meters.

The owner of the field containing this site was not willing to allow me to leave any permanent mark, in case it should interfere with plowing. She did not object to my marking another sation, (on unplowed land) at a distance of about 0.25 kilometer south and situated on the slope of an ironstone kopje.

As the result of working in too dim light at Bloemfontein and Karree, I suffered a good deal from eyestrain, which was at one time so bad that I feared that I should have to discontinue permanently the magnetic survey work. For the next week or two I made deflection observations at two distances only to rest my eyes as much as possible, and they gradually became less painful.

I found the locality of Beattie's station at Springfontein without difficulty, and occupied it with a probable error of about 30 meters.

No description of the previous station at Queenstown was available; so I selected one in an open space among bushes.

Queenstown was a pleasant place to work. The breeze was sufficient to make bearable the fairly high temperature but was not strong enough to interfere at all with the experiments.

At East London, buildings with corrugated iron roofs have been erected in the neighborhood of Beattie's station, and electric trams run along the esplanade, rendering the immediate neighborhood unsuitable for magnetic work. After consulting Mr. Lambe, the City Electrical Engineer, I came to the conclusion that the golf course, 3 kilometers northeast of Beattie's site, gave the best promise of future availability. Mr. Lambe gave me much assistance in obtaining permission to work on the golf course and to have meals at the golf clubhouse, providing a motor lorry to carry my apparatus, and offering to put down permanent marks at the two stations occupied.

The tent was in each case pitched on very sandy turf, and the wind was sufficiently strong to make necessary frequent inspections of the tent pegs. Otherwise, conditions were good except in the early morning when sea mists made the light very bad. No electrification of the tent was observed even in vigorous sandstorms. The native boys employed were unsatisfactory and could be relied upon to turn up late when an early morning start was desired.

Diurnal-variation observations were taken here; the curve for inclination was quite different from that obtained at Bloemfontein.

I next went to Somerset East, intending to establish a station near Dr. Schonland's atmospheric-electricity observatory there and to reoccupy Cookhouse. High wind and dust and the fact that Cradock had been occupied more often and gave better distribution of stations made me decide to go there instead.

It was difficult to decide whether to occupy Beattie's old station at Cradock; a large house with an iron roof had been erected about 50 meters from the site, and it seemed probable that others would be put up even nearer; so I decided to take a more permanent one half a kilometer away, on the corner of the golf course.

At Grahamstown, Beattie's old station was not accurately recoverable and a more convenient site was occupied on the lawn of Rhodes University College. Mr. Varder, professor of physics, had asked me to make a comparison with his Kew instrument, No. 164, used by Beattie 1910-1911. As he had no observer available, I observed for H with his instrument on the morning of one day and the afternoon of another, and with CIW No. 13 on the afternoon and the morning of the same days at about the same mean times.

At Uitenhage, rain, bad light, and high wind made work very slow. Since Beattie's old site had been built upon, I chose another 0.8 kilometer northwest. An auxiliary station was selected an equal distance southwest, but the wind was too strong to allow observations to be taken there. Three attempts were made to erect the tent; after the pegs had been carried away several times we got it up (but not upright), and it was obviously unsafe to place the instrument inside it. I therefore went back to the old site for the remaining half day.

At Willowmore, it was impossible to determine even the approximate position of Beattie's station, as there are two roads that lead to Prince Albert, one at each end of the town; both cross the river, but neither has a genuine fork for several miles from the town. I therefore chose a site near the road nearest the hotel and just across the river at a latitude about 5′ greater than Beattie's, which suggests that his site was at the fork in the other road, six miles further north.

At Mossel Bay, the old site was impossible to locate, and the place that seemed most probable had been built upon. I occupied a station about 0.3 kilometer away. Sun observations were impossible owing to sea mist, and inclination could not be determined, apparently owing to breakdown of the galvanometer insulation. Declination was obtained relative to a survey beacon, and the readings should permit determination of true north by reference to plans in the Surveyor General's Office.

The magnetic conditions appeared to be fairly steady on most of the occasions on which observations were made, but on a few occasions considerable irregular fluctuations were observed, especially in the determination of dip and of intensity.

Observational conditions were often rather unpleasant On the Karroo, it was usually impossible to take dip observations after 9:00 A.M. owing to intense electrification of the tent. The sagging in of the windward side of the tent often endangered the magnetometer and work had to be frequently interrupted in order to make the necessary adjustments as the wind veered from east, through north, to west during the course of the day. On several occasions it was necessary to move all the pegs at the base of the tent a foot or two towards the new direction of the wind before work could be accomplished in safety.

Local disturbance seems to exist at Karree and East London, for at both of these places a considerable difference in declination was found at the auxiliary station occupied. The difference in dip observed at Matjesfontein seems to have been due to a magnetic storm coinciding with the readings at station B.

People were everywhere obliging and cheerfully gave assistance when necessary. At Matjesfontein, Hutchinson, Grahamstown, and Springfontein owners of long-range wireless sets enabled me to pick up Capetown time signals. Town officials and private individuals were often of considerable assistance in helping me to locate previous stations when the published description was insufficient; permission to reoccupy the stations was always readily granted. At Queenstown, East London, and Uitenhage the Municipal Engineer at each place offered to erect a permanent mark at the station, thereby saving me considerable time, trouble, and expense.

The following comments relate especially to the observations of December, 1928, and January and February, 1929.

It was originally intended to occupy Windhoek first, and then the other stations in the order in which they were listed in the instructions, but several alterations were found to be advisable.

I left Capetown by train on the evening of December 17, and arrived at Windhoek on the evening of December 20. The journey was exceedingly hot, and the train was without water for washing purposes during part of the third day, owing to shortage at several stations where tanks were usually replenished. For comfort on a journey such as this, several changes of cool clothing and a canvas bag for drinking-water should be carried in the compartment.

On December 21 I called at the Administrator's Office at Windhoek and was very cordially received by Mr. Edwards, of the Native Affairs Department, who was temporarily in charge. He introduced me to Mr. Parry, the acting Surveyor General. I explained the nature of the work I intended, and they gave me much useful information.

Mr. Edwards advised me whom I ought to interview at each of the stations in my itinerary, and to whom I should apply for native boys to work for me. He also told me that Otavi and Tsumeb were in a malaria zone and recommended me to occupy them before the rains, which were expected soon.

Mr. Parry showed great interest in the proposed work and asked to be supplied with the results of the survey at the end of the trip. He presented to me a complete set of the last 1:500,000 International Maps of South West Africa and also furnished a list of the 1909 magnetic observations in the territory. These maps proved of very great value. They enabled me to find my latitude without taking noon sun observations; hence it was not necessary to work in the open when the Sun was high, nor to interrupt magnetic work to take sun observations. The longitude of the stations was also found from the maps, and the chronometer corrections to GMT were calculated from these and the LMT observations. As no wireless time signals were received during the whole trip, this furnished the only check on chronometer rates.

At Windhoek I interviewed the Town Clerk and the Town Surveyor for permission to observe. The latter accompanied me to the neighborhood of the magnetic station and pointed out the beacons (iron pins driven flush with the ground) defining the boundaries of proposed roads.

The 1916 CIW station was located to within about 1 meter by means of the photographs; the bushes and trees had scarcely changed in shape or size during the intervening 13 years, and identification was easy. The site was found to be on the edge of the track which at present serves as a motor road; to reoccupy it exactly would have required that the tent ropes be carried right across the road, and traffic diverted slightly into the veld. The officials were prepared to give permission for this expedient if I considered it absolutely necessary. However, it seemed to me that there was considerable danger that a carelessly driven car might strike the tent during the night so I chose a new site protected by bushes a few meters away. An auxiliary station was also occupied, further to the west, and away from the town.

Difficulty was experienced in getting a boy to work for me. On the first day one was sent to me by the officer in charge of the location, but he failed to turn up the next day, and from that time on I had to rely on occasional help from the hotel boys and friends of theirs. For the greater part of the time I had to work alone; this made it necessary to return to the hotel for meals during diurnal-variation observations.

Desiring to reach Otavi and Tsumeb before the rains, I decided to occupy next these stations and Kalkfeld. These lay on the branch line from Usakos, a 2-foot gauge light railway carrying mineral traffic to and from the mines and smelters at Tsumeb, in heavy trains with a few passenger coaches. The line runs through bushveld which is surprisingly green. Occasional glimpses of big game may be seen from the train. Shortly before reaching Kalkfeld, the engine failed to pull the train up a hill. After some delay, it ran back about half a mile, and tried again with a flying start. This failed (in spite of the fact that many passengers got out and pushed), but a third attempt, with a flying start of a mile, was successful. The total delay was two hours, which was considered very slight. The "up-train" that day was delayed considerably longer by the engine's breaking down completely.

Through an oversight, my tourist ticket took me only as far as Kalkfeld. It happened that by waiting two days for the next train I was able to obtain excursion fares; so I reoccupied Mansfield's 1909 station at Kalkfeld in the interval. Since the 1909 site was in the neighborhood of some buildings of corrugated iron, I chose a new site, about 100 meters away. The value found for secular variation of declination agreed with that found for Windhoek. A rainstorm occurred at midday and enabled me to take afternoon readings of dip, (a thing not usually possible in such a dusty country).

Because of the remarkably good hotel and healthy climate, I decided to return here for diurnal variation readings if Tsumeb proved unhealthy or too hot. The hotel lent me a boy, and permission to observe was obtained from the manager of the adjoining store.

I next proceeded to Otavi, where I remained two days. Here also new corrugated iron buildings made the old site unsuitable and a new one was chosen 150 meters away. Magnetic and electrical conditions were excellent, there being very little wind, but the heat and the smell of the place were oppressive, and work was unusually fatiguing.

The land here is owned by the Otavi Mining Company, whose offices are at Tsumeb. Not having time to get in touch with them, I telephoned to the police station at Otavifontein, and the sergeant in charge assured me that there would be no objection to my carrying out observations. The hotel lent me a native boy.

During the afternoon of the second day, I walked to Otavifontein where there is a stream of running water that flows throughout the year. I heard of only one other in the whole of South-West Africa. I called at the police station, and the sergeant, hearing I was interested in anthropology, showed me a Bushman prisoner and presented me with a Bushman bow and quiver of poisoned arrows.

At Otavi, a careful lookout must be kept for snakes. They may even be found in the bedroom at night. It is considered unsafe to walk about out of doors at night without an electric torch. I also lost some sleep from the buzzing of mosquitoes, in spite of a net.

On the evening of January 3 I went on to Tsumeb by train, arriving at midnight. Here I interviewed Mr. Kegel, the manager of the Otavi Mining Company, to obtain permission to observe. This was readily granted, and he further offered to provide me with any assistance required. I made inquiries about direct current plant in use on the mines and found that direct current was used for traction at the smelter.

The position of the 1909 station appeared to be too near some iron sheds, and no good alternative site could be found in the same locality. I therefore chose a new site, farther away from the smelter, outside the town, 400 meters to the west of the old one.

At this station I was lucky in obtaining an intelligent boy who could speak English. This fact enabled me to complete the field observations in one day, in spite of the heat.

Tsumeb is a very hot place but, during the afternoon, work in the tent was not unpleasant, provided both doors were left open and a current of air passed through. This naturally makes the observations rather less accurate than they would be in still air, but not seriously so.

On the third day of my stay I was informed that it was undesirable to drink the tap-water without first boiling it; it is water pumped from the mines, purified with chlorin. Before learning this I had drunk large quantities unboiled but I did not suffer any ill effects from it.

I was anxious to get away from the fever zone about Tsumeb as soon as possible, and therefore left by the next train and arrived at Kalkfeld on January 7. Here I established a second station as near to the hotel as was practicable, and carried out diurnal-variation observations.

The altitude of Kalkfeld is greater than that of the Otavi-Tsumeb region, and the air is drier. Nevertheless, conditions are not ideal for prolonged observations. High winds and dust in the daytime keep the observer in a state of nervous strain, and occasional mosquitoes at night cause considerable loss of sleep. By the end of the third day, I felt thoroughly exhausted.

The change of climate between Kalkfeld and Swakopmund is startling and would be dangerous if one was not prepared and arrived at the latter place in tropical kit. I got there at 4:00 A.M. on January 12. There was a cold wind, and a damp sea fog, and this persisted during the greater part of my stay of 11 days. The Sun was usually not visible until shortly before noon and disappeared early in the afternoon. The middle of the day was usually hot and muggy; mornings and evenings were decidedly chilly.

I rested during the first three days of my stay, contenting myself with locating the 1916 station from the photographs. The position was later confirmed by measurement of angles.

The site thus located proved to be on a roadway, one edge of which was defined by large iron bins full of sand. The station was very close to one bin, and there were two iron telephone standards at no great distance. I decided to establish a new station, 160 meters away. A second station 240 meters farther in the same straight line was afterwards used, and diurnal-variation observations were taken.

Suspecting possible local disturbance, owing to scrap iron beneath the surface of the sand (all three stations were situated on what was once a military camp) I made approximate determinations of declination at a number of other points, including the 1916 station. These differed from each other by a few minutes only; incidentally the 1916 readings were found in better agreement with station B than with station A.

I applied to the magistrate for permission to observe, and this was granted. On his advice I applied to the police for a native boy to help with the tent. They took a day to find one, and when he came he proved to be the most stupid that I had yet worked with. Except for the fact that he was never more than an hour late, I think I should have engaged another, even though it meant a day's delay. He was a Klipkaffir, and his knowledge of English, Afrikaans, and German was so slight that I was unable to gather which he understood best. Even signs and gestures were quite lost upon him.

After work one afternoon I took the train to Walvis Bay, thinking it might be worth establishing a station there. It is a large area of flat sand thickly covered with railway lines and iron sheds and seemed completely unsuitable for the purpose; rapid expansion of the town would render any site in the immediate neighborhood unavailable in ten years' time.

After 11 days of misty weather it was a pleasure to get to Karibib, where the sky was clear. Rain had fallen two days previously, and the air was cooler than usual. I was told that it was rarely so pleasant there.

Permission to observe was obtained from the magistrate, and an intelligent and energetic native boy was found by the hotel. The 1909 site was located to within a few meters, and satisfactory measurements were carried out. A north-south line was also established, at the suggestion of the Town Clerk.

The next mail train, two days later, took me to Gibeon. Since the town is seven miles from the station, I was lucky in meeting Dr. Weinberg, the district medical officer, on the train; he invited me to stay at his house and drove me from the station to the town in his car. He introduced me to the acting magistrate, who gave the necessary permission to observe, and suggested that I should borrow a couple of native police-boys to help me with the tent. These proved unsatisfactory, being unwilling really to exert themselves, and unreliable in turning up at the hour appointed. Two did less work than is usually done by one native. Moreover, they were more expensive.

At Gibeon for the first time I felt really unwell on account of the heat. The ground is covered with large black boulders, which seem to radiate as much heat upwards as the Sun does from above. Even wearing a sun helmet, or working in the tent and canopy, I imagined I was getting sunstroke. I reduced the program of observations to a minimum and rested as much as possible. Luckily there were no mosquitoes, and it was possible to sleep out of doors at night.

The 1916 station was recovered to within about a meter, the photograph again proving of the utmost value, although many of the buildings shown in it had changed.

I telephoned from here to the Smithsonian Solar Observatory at Mount Brukkaros, and Mrs. Hoover, the wife of the Director, told me that her husband was in Keetmanshoop, fetching supplies. I therefore took the next train to Keetmanshoop, and he motored me to Mount Brukkaros, a distance of 100 kilometers. His garage was halfway up the slope of the mountain. The remainder of the distance had to be climbed on foot. The heavy luggage was brought up slung on donkeys.

Mr. Hoover, to whom I had written a month before, was familiar with the requirements of magnetic stations, and at once pointed out the two best sites for my work. I found them excellent, the only drawback being occasional wind-gusts of alarming strength. However, we secured the tent ropes to large anchor stones and built cairns on each of the anchors, and no mishap occurred, although on the day for diurnal variation of declination and horizontal intensity there was a thunderstorm, accompanied by wind of such strength that I put the instruments away, intending to discontinue for the day. It died away almost as suddenly as it came up, so I was able to resume observations after an interval of about two hours.

After a stay of nine days, Mr. Greely (Hoover's assistant) drove me back to Keetmanshoop, and I attempted to reoccupy the 1916 station. There had been a great deal of building since that date, obscuring some of the marks, and the description of some of the others was found to be ambiguous. An uncertainty of about 20 meters resulted. Satisfactory sun observations were not obtained because of cloudy weather; the records for this station hence are incomplete, but I think that my description of the site will enable the next observer to determine the azimuth of my marks and thus utilize my readings of declination for calculating the secular variation.

Permission to observe was obtained from the Town Clerk's office. The native boy found by the police again proved unsatisfactory; so Mr. Greely lent me his boy.

The next station proposed was Rotkuppe. I found that it was in the diamond fields and that a special permit would be required to leave the train at this place. This I might obtain at Luderitzbucht.

I went by train to Luderitzbucht and saw that Rotkuppe was not a comfortable place to reoccupy. It is a railway halt in absolutely barren desert. There were no water, no buildings but a corrugated iron shelter, and no vegetation to speak of. To take two days' observations would require a railway truck of water, two or three native servants, and probably a detective to see that I didn't go diamond-hunting. Such an expedition would have required two or three days to organize; so I decided not to do so and established a station at Luderitzbucht instead.

Luderitzbucht is a pretty town, built on bare rocks around a nearly landlocked bay. In two hours' search I failed to find a possible place to erect a tent; a friend then pointed out to me the sports ground, which proved suitable; the town authorities were very courteous and readily gave the necessary permission. The hotel manager found me a satisfactory boy, and I carried out an enlarged Class III program, with some diurnal variation observations.

The magistrate from Luderitz traveled to Aus on the same train as I and gave me permission to observe there too. A good boy was obtained from the hotel, and the weather conditions were excellent. The 1916 station was recovered exactly, Mr. Sawyer having built a cairn over his mark-stone. An auxiliary station further south was also occupied, the complete program for a Class II station being performed in two days.

The Seeheim site was not easy to locate exactly; flooding of the Great Fish River in 1918 had removed most of the land marks in the foreground of the photograph, the hotel for which the azimuth is given was no longer standing, and it was not clear at first sight to which telegraph pole reference is made. When the most probable site had been chosen, it was found impossible to erect the tent at this place, owing to the nature of the ground, which was made up of small stones covered with a thin layer of sand. A new site was therefore chosen among some bushes about 22 meters away, where the ground was somewhat softer and a few pegs could be driven into the ground. As many as possible of the ropes were secured to the bushes.

I was told that Seeheim was the hottest place in South-

West Africa. It was not unbearable at the time of my visit, but I can believe that it might easily become so.

Magnetic conditions were good at most times and places. At Kalkfeld there was reason to suspect local disturbance, owing to discrepancy in all three elements between stations A and B. A few observations were taken at a third station (without erecting the tent), and these disagreed with those from both of the other stations.

This trip proved very enjoyable from the observer's point of view. People were everywhere exceedingly friendly, and the train service (three trains per week) prevented undue haste at most of the stations and frequently left time for the observer to see something of the country.

Two cordial invitations to join parties going into Ovamboland, and thus extend my observations further north, had to be regretfully declined owing to lack of time.

EARL HANSON, ON MAGNETIC WORK IN WEST INDIES AND SOUTH AMERICA, AUGUST, 1931, TO JANUARY, 1933

Accompanying Mr. J. W. Green, of the staff of the Department, I sailed from New York for Havana, Cuba, on August 5, 1931, and arrived at the latter port on August 8. Here, after obtaining the necessary permit from military authorities to make magnetic observations, I began my magnetic field work by assisting Mr. Green with the occupation of station A at Casa Blanca on August 10. Further instructions in observing and computing were received on August 11, 12, and 13, and on the afternoon of the last date the journey was made to Pinar del Rio. Here I made my first observations alone, reoccupying the station of 1922 on August 15.

We returned to Havana on August 17 and departed for Matanzas on the following day.

Mr. Green and I went on to Santiago, arriving there August 20. I occupied stations A and C at Santiago on August 22 and 24, and we planned to leave for Kingston, Jamaica, on August 26. The boat was delayed, however, and we did not sail until August 29. In the meantime, sketches and descriptions of stations were prepared, computations completed, and work done on accounts and records.

We arrived at Kingston August 30, and traveled to Montego Bay by train on September 1. Permission was secured from local authorities to work there, and I occupied stations A and B on September 3, 4, and 5. We returned to Kingston on September 7, and left by steamer for Santo Domingo, in the Dominican Republic, on September 10. We arrived September 13, and on the following day left for San Juan, Porto Rico, by another steamer. We arrived at San Juan September 15 and went immediately to visit San Juan Observatory. Observations were made at the observatory September 17 to 27, preparations being made, meanwhile, for my departure for Caracas, Venezuela. I left San Juan for Caracas on September 28, there taking leave of Mr. Green who had been exceedingly helpful in teaching me the methods and techniques of magnetic field work, during the preceding several weeks.

On arrival in Caracas September 30, I called on the United States minister. He said that such programs as my proposed magnetic survey of Venezuela, which was outside of the regular operations of government officials, were looked on with disfavor, and that making the necessary arrangements involved a great deal of time and effort.

When I called on Dr. Luis Ugueto at the Caracas Observatory, I found him extremely courteous and helpful; but, unfortunately, he was no longer the director there. The observatory was being remodeled by government officials. This meant a delay of several days before I was given permission to set up and observe on the observatory grounds, even though Dr. Ugueto went personally to the capitol with me to obtain the needed permission. Meanwhile, it became apparent that a general letter from the government would be absolutely essential. The United States minister gave me a personal note of introduction to the Minister of the Interior, and I saw the minister on Saturday, October 3, and again on October 7. He asked me to call again October 8 when he promised to have needed papers ready for me.

During my stay in Caracas I had been unable to do much observing. I had made observations only on October 4. I observed also from October 8 to 12, and made plans to leave for Puerto Cabello about October 13.

One redeeming feature about these delays was that they gave me a good opportunity to study my future work on the Orinoco River and inland. I was able to obtain much information and concrete help that saved me a great deal of time and effort later on. Mr. Simon Planas gave me detailed information about the trip between San Fernando de Apure and Manaos, as well as letters of introduction to influential patrons and commercial factors all along the line. These later proved to be of great value. Overland travel, by motor truck and bus, was found to be extremely cheap in this country, at least in those cases where one can catch a conveyance that is going anyway and does not have to be especially chartered.

My immediate plans were to travel overland to Puerto Cabello, stay one day there, then overland to La Ceiba, then across the Lake to Maracaibo, and then to return overland to Caracas. From there, I planned to go by truck to Villa de Cura and Calabozo, a two day trip. From Calabozo to San Fernando de Apure, the roads were at that time of the year impassable for autos, but there seemed to be a lot of mule carts available. I was told that I might find it necessary to descend to Ciudad Bolivar from San Fernando, in order to get transportation to San Fernando de Atabapo.

Making observations at Caracas at this time of the year was somewhat difficult. The end of the rainy season was still about two weeks off. I had a heavy rainstorm almost every afternoon, and solar work was impossible except in the mornings. Twice the work was interrupted by a heavy storm before being completed. The matter of getting government permission to work in Venezuela was arranged October 8. Immediately on receipt of my letter, Dr. Pedro Tinoco, the Minister of the Interior, gave me a very fine letter of recommendation to all government officials throughout Venezuela.

I left for Puerto Cabello October 15, expecting to return to Caracas and to start for the interior in about two weeks. I maintained this schedule quite well, as I returned to Caracas from the trip to Puerto Cabello, Isla Pajaro, Maracaibo and Valera on November 3. I spent most of my time November 4 and 5 in bed, on account of

Table 17

No.	Station	Date	Latitude		Longitude East	
			°	′	°	′
		1931				
1	Pinar del Rio, Cuba	Aug 15	22	25.0 N	276	18
2	Santiago, C, Cuba	Aug 22	20	00.5 N	284	11
3	Santiago, A, Cuba	Aug 24	20	00.5 N	284	12
4	Montego Bay, A, Jamaica	Sep 3, 5	18	28.5 N	282	04
5	Montego Bay, B, Jamaica	Sep 4	18	28.5 N	282	04
6	San Juan, Puerto Rico	Sep 17-27	18	23 N	293	53
7	Caracas, A, Venezuela	Oct 4, 8	10	30.4 N	293	04
8	Caracas, B, Venezuela	Oct 9-12	10	30.4 N	293	04
9	Puerto Cabello, Venezuela	Oct 17	10	28.4 N	292	00
10	Isla Pajaro, Venezuela	Oct 23, 25	10	35.5 N	288	28
11	Maracaibo, Venezuela	Oct 26	10	40.7 N	288	24
12	Valera, Venezuela	Oct 31	9	19.4 N	289	25
13	Villa de Cura, Venezuela	Nov 11	10	02.5 N	292	30
14	San Fernando de Apure, Venezuela	Nov 22, 23	7	53.9 N	292	32
15	Ciudad Bolivar, A, Venezuela	Nov 28-30	8	09.5 N	296	28
16	Ciudad Bolivar, B, Venezuela	Dec 5	8	09.5 N	296	28
17	La Urbana, A, Venezuela	Dec 13	7	08.5 N	293	03
18	La Urbana, B, Venezuela	Dec 14	7	08.5 N	293	03
19	Puerto Ayacucho, B, Venezuela	Dec 19, 23	5	40.8 N	292	22
20	Puerto Ayacucho, A, Venezuela	Dec 20-23	5	40.8 N	292	22
21	Zamuro, Venezuela	Dec 22	5	39.2 N	292	23
		1932				
22	San Fernando de Atabapo, B, Venezuela	Jan 1, 2	4	03.0 N	292	19
23	San Fernando de Atabapo, A, Venezuela	Jan 2- 4	4	03.0 N	292	19
24	Maroa, Venezuela	Jan 13	2	40.9 N	292	26
25	Comunidad, Venezuela	Jan 15	2	23.1 N	292	49
26	San Carlos, Venezuela	Jan 17	1	55.2 N	292	58
27	Cucuhy, A, Brazil	Jan 22-24	1	11.4 N	293	10
28	Cucuhy, B, Brazil	Jan 25	1	11.4 N	293	10
29	San Gabriel, Brazil	Jan 28	0	08.2 S	292	54
30	Santa Isabel, B, Brazil	Feb 2- 4	0	25.2 S	294	58
31	Santa Isabel, A, Brazil	Feb 5, 6	0	29.9 S	294	58
32	Barcellos, A, Brazil	Feb 10, 11	0	58.5 S	297	05
33	Barcellos, B, Brazil	Feb 12	0	58.5 S	297	05
34	Manaos, B, Brazil	Mar 4, 5	3	07.6 S	299	58
35	Caracarahy, Brazil	Mar 19	1	48.7 N	298	52
36	Boa Vista, A, Brazil	Mar 26, 28, 30	2	49.0 N	299	21
37	Boa Vista, B, Brazil	Mar 31	2	49.0 N	299	20
38	Boa Vista, A, Brazil	Apr 3	2	49.0 N	299	21
39	Manaos, A, Brazil	Apr 15	3	08.7 S	299	59
40	Manaos, C, Brazil	Apr 16	3	08.1 S	299	59
41	Manaos, D, Brazil	Apr 18	3	07.0 S	299	56
42	Obidos, A, Brazil	Apr 22, 23	1	55.0 S	304	29
43	Obidos, B, Brazil	Apr 24, 25	1	55.0 S	304	29
44	Santarem, A, Brazil	Apr 29, 30	2	24.9 S	305	18
45	Santarem, B, Brazil	May 1	2	25.0 S	305	16
46	Manaos, D, Brazil	May 12	3	07.0 S	299	56
47	Manaos, B, Brazil	May 20	3	07.6 S	299	58
48	Abuna, Brazil	May 31, Jun 1	9	42.0 S	294	38
49	Cachuela Esperanza, Bolivia	Jun 3, 4	10	32.6 S	294	25
50	Riberalta, Bolivia	Jun 6	11	00.0 S	293	55
51	Guajara Mirim, Brazil	Jun 10	10	47.0 S	294	39
52	Guayaramerim, A, Bolivia	Jun 13, 14	10	48.8 S	294	39
53	Guayaramerim, B, Bolivia	Jun 15	10	48.8 S	294	39
54	Porto Velho, A, Brazil	Jun 20-23	8	46.0 S	296	06
55	Porto Velho, B, Brazil	Jun 24	8	46.0 S	296	06
56	Bocca do Jutahy, Brazil	Jul 14	2	42 S	293	10
57	Esperança, Brazil	Jul 18	4	23.6 S	289	59
58	Iquitos, A, Peru	Jul 26-31	3	45.6 S	286	45
59	Iquitos, B, Peru	Jul 28	3	45.6 S	286	45
60	Nauta, Peru	Aug 6, 7	4	29.3 S	286	26
61	Barranca, A, Peru	Aug 15	4	49.6 S	283	20
62	Barranca, B, Peru	Aug 16	4	49.6 S	283	20
63	Tres Unidos, B, Peru	Aug 17	5	05.7 S	284	24
64	Tres Unidos, A, Peru	Aug 18	5	05.6 S	284	23
65	Yurimaguas, A, Peru	Aug 24	5	53.9 S	283	55
66	Yurimaguas, B, Peru	Aug 26	5	54.0 S	283	54
67	Moyobamba, A, Peru	Sep 1, 3, 4, 5	6	04.4 S	283	02

Table 17--concluded

No.	Station	Date	Latitude	Longitude East
		1932	° '	° '
68	Moyobamba, B, Peru	Sep 1, 2	6 04.5 S	283 02
69	Moyobamba, C, Peru	Sep 2	6 04.5 S	283 02
70	Chachapoyas, Peru	Sep 18, 19	6 12.6 S	282 07
71	Cajamarca, A, Peru	Sep 28-30	7 07.8 S	281 29
72	Cajamarca, B, Peru	Oct 1	7 07.8 S	281 29
73	Chilete, Peru	Oct 4	7 13.2 S	281 10
74	Pacasmayo, A, Peru	Oct 7, 8	7 23.4 S	280 26
75	Pacasmayo, B, Peru	Oct 9	7 23.4 S	280 26
76	Piura, B, Peru	Nov 6, 7	5 11.4 S	279 22
77	Piura, A, Peru	Nov 8	5 11.7 S	279 22
78	Paita, Peru	Nov 10	5 04.7 S	278 54
79	Quito, A, Ecuador	Nov 22, 23	0 13.1 S	281 31
80	Quito, B, Ecuador	Nov 24, 25	0 13.1 S	281 28
81	Quito, C, Ecuador	Nov 25-28	0 13.6 S	281 29
82	Quito, C (Secondary), Ecuador	Nov 28	0 13.6 S	281 29
83	Guayaquil, Ecuador	Nov 17-Dec 6, 7	2 10.8 S	280 09
84	Buenaventura, Colombia	Dec 14	3 54.1 N	282 55
85	Cali, Colombia	Dec 17	3 27.1 N	283 26
86	Bogotá, B, Colombia	Dec 23-26	4 37.6 N	285 54
87	Puerto Berrio, Colombia	Dec 29, 30	6 28.9 N	285 36
		1933		
88	Barranquilla, Colombia	Jan 8	10 59.3 N	285 13
89	Puerto Colombia, Colombia	Jan 9, 10	10 59.6 N	285 02

an illness that seemed to threaten malaria, but which turned out to be only a combination of a bad cold, indigestion, and inflamed eyes.

I found overland travel facilities on the whole very good, and certainly they were plentiful. One great drawback, however, was that most of the hotels I encountered had very limited accommodations. This was probably because I did not know the country and had to take the truck drivers' word for the hotels. The Hotel Universal in Barquisimeto and the Hotel Haack in Valera were, however, very good.

Although the roads were rather bad in some places, my method of travel took care of that difficulty. Hiring a private car was out of the question on account of the expense, and traveling on the trans-Andean bus line was deemed inadequate because, in that way, I would lose all control and supervision over my instruments. Both going and returning, therefore, I connected with independent truck drivers, of whom there were many. Paying them a bit more than the fare they asked gave me a certain amount of control over their movements, made me feel free to tell them when to slow down, and when to stop and unload the instruments so that their helpers and myself could carry them around some particularly bad spot in the road while the trucks went ahead. In that way, things went quite well, and the trucks were so numerous that I did not have to lose any time searching for them.

I found La Ceiba not only poorly situated for a permanent station, but impossible for any station at all. There was no open ground left on which to establish a station. There were not five square feet of dry ground that were not either in the middle of a road or within ten feet or so of a corrugated iron roof or a railroad track. All the rest of the land for many miles around was deep, jungle-covered swamp. Instead, I set up a new station at Valera, an overnight stopping place for all busses and trucks on the main trans-Andean highway and the most accessible place in the vicinity. I had the description of the Barquisimento station with me and thought of occupying it, but my truck driver could not wait a day for me. Since he was so evidently reliable and so careful with my instruments, I did not want to risk losing him and going on to Caracas with somebody else.

The old Maracaibo station was not available as the neighborhood was completely built up. In addition to occupying Isla Pajaro, therefore, I established a new station on the golf course at Maracaibo where there was a good chance of permanency.

The trip from Caracas to San Fernando offered many unexpected difficulties and delays. When I returned to Caracas, November 3, I found that the truck driver who had previously agreed to take me to Calabozo on the way to San Fernando had not been in Caracas for two weeks because of illness. Moreover, there had been no truck at all from Calabozo during that time, and a thorough search of the garages, as well as the travel agencies, revealed that traffic between Caracas and Calabozo had practically stopped because of lack of freight and passengers and because of the condition of the roads. This situation brought up a new problem. It did not seem practical to try to get to Ciudad Bolivar through Barcelona, because that road also is little used in the rainy season. I seriously considered flying to Ciudad Bolivar, though the cost of transporting my 500 pounds of baggage would have been expensive. About this time, however, the truck driver who had brought me from Valera to Caracas offered to take me to Calabozo as a special trip, with one day's stopover in Villa de Cura, and with no charge if he failed to deliver me and my instruments safely in Calabozo, and that part of the trip was accomplished without difficulty. The roads on the whole were quite good, and at Villa de Cura I managed to make a very close reoccupation of Power's old station on November 10.

At Calabozo, however, I found that all cart service to San Fernando had been suspended because of lack of freight and that the road was reported to be in an exceedingly bad condition, because of the unusually heavy rains of the past month. No truck could get through at all. One cart driver was willing to transport me to Camaguan, but his price was exorbitant. One evening and a half a day of searching revealed nothing more, till at last I appealed to the "jefe civil" for help. The latter very kindly called in the mail contractor, who in turn agreed to furnish me with a saddle mule and to send an extra cart for my baggage with the mail cart. This was welcome news, the only drawback being that the mail left the following day, thus preventing an occupation at Calabozo.

The going was always slow, and at times extremely hard. The 130 kilometers from Calabozo to Camaguan took six days, during which time we were mired a good many times. The last five kilometers took 10 hours, a heavy rain the night before having raised the level of the water to an almost impassable height. At times our loads were half submerged, but heavy waterproof tarpaulins over and under the loads kept everything perfectly dry. During the five kilometers traveled the last day, we had to unload the carts twice and transport the cargoes in a canoe to some point where the mules were able to pull the loaded carts again, and where the water was too shallow for the canoe. It was fortunate that the steamer to San Fernando was waiting in Camaguan and was ready to take me and the mail without any appreciable loss of time. The steamer arrived at San Fernando November 20, and on November 22 and 23 a close reoccupation of the San Fernando de Apure station of 1914 was made.

Realizing that I might need official help that I could not expect to get in Caicara, I came to Ciudad Bolivar from San Fernando by steamer, sailing November 24. Immediately on my arrival, November 27, I called on Dr. Munoz, the President of the State of Bolivar and laid my plans before him. He was extremely kind, told me that the new governor of the Amazon Territories was in Ciudad Bolivar and that he expected to leave for Puerto Ayacucho in a few days. He assured me that not only would there be no difficulty about my accompanying him, but that the governor would in all probability be willing to wait one day in Caicara and two days in La Urbana, to give me an opportunity to make observations.

The work of observing and computing in Ciudad Bolivar from November 28 to 30, was done under somewhat difficult circumstances. I was ill and felt very much like going to bed and staying there. However, I felt that the limited time available, because the governor might leave any day, made any delay inadvisable; hence, I hired a man to do the heavy work, carry the bundles, erect the tent, etc., and I did what I could. The continued absence of the Sun, whenever I needed it for observations, did not help matters any. The rainy season this year was lasting an unusually long time--every day we had three or four heavy showers.

At odd moments, between observing and computing, I was able to buy the food, cooking utensils, etc., needed for the forthcoming river trip, and at last everything was ready. With luck, I might yet get to Manaos at the time planned. As the governor was going up in a special government launch, I hoped he would take me along as a guest. At any rate, I was deeply grateful both to him and Dr. Munoz for much assistance. I realized more and more that the time spent in Caracas, waiting for the credentials from the Minister of the Interior, was thoroughly well spent.

My hopes for traveling with the governor failed to materialize, and I started up the Orinoco River on December 6 in the sailboat Alfa. After a pleasant voyage of seven days, we arrived at La Urbana on December 12. I got an exact reoccupation at La Urbana on December 13 and also established a new station B there on December 14 on higher ground than the old station because Power's station is nearly always flooded by the high water of the Orinoco during the rainy season.

I arrived in Puerto Ayacucho on December 18 and found that it would take me another six weeks or so to reach Manaos, possibly longer. Three travelers had just arrived that morning from Manaos and reported the going very slow, with only one launch a month from Cucuhy to Santa Isabel. However, as far as my departure from Puerto Ayacucho was concerned, I was in luck. The Venezuelan government was changing its officials all the way from Puerto Ayacucho to the border, and there was a good deal of traffic. Going to San Fernando de Atabapo, I joined forces with Colonel Caldera, the new "jefe civil" of Atabapo. He planned to stay in Puerto Ayacucho about five days, which gave me plenty of time for a reoccupation of Power's old station at Zamuro and the establishment of a new station at Puerto Ayacucho. Stations A and B at Puerto Ayacucho were occupied December 19, 20, and 23, and the station at Zamuro on December 22.

During the river trip, my health had improved, as I knew it would as soon as I had some control over my food and cooking. In Ciudad Bolivar, I had felt that I should be in a hospital, but on leaving I gradually recuperated, and it seemed that the trip from Ciudad Bolivar was the most pleasant and interesting I had ever made.

On December 24, supplies and equipment were assembled and the canoe was made ready for the trip to San Fernando de Atabapo, where I arrived on December 30. The following day luggage and equipment were moved to quarters on shore, the canoe-men were paid off, and inquiries were begun concerning the next part of the journey to Yanta.

Stations A and B at San Fernando de Atabapo were occupied from January 1 to 4, and the journey to Yanta begun on the latter date. Five days of travel in cloudy but otherwise good weather brought me to Yanta on January 10. Here it was raining, and from this time on there was rain nearly every day until the middle of February.

Supplies and equipment were next day portaged across the Pimichin River at Yanta and the journey to Maroa was made down this river on January 12.

The station at Maroa was occupied on January 13, followed by occupations at Comunidad on January 15 and San Carlos on January 17, with intervening days devoted to river travel by canoe.

From San Carlos, a trip of two days brought me to Cucuhy, where fresh supplies were obtained, and I again became ill with a malarial attack. Stations A and B at Cucuhy were occupied January 22, 24, and 25, with intervals of rest taken to combat the attack of malaria. Rain showers occurred regularly nearly every day.

For the next 20 days before arriving in Manoas, my program consisted of a few days of travel alternating with a few days of magnetic observations, the weather meanwhile continuing unpleasant and my illness showing no promise of improvement. Both the weather and my illness retarded the observing program considerably, but occupations of stations were made at San Gabriel on January 28, Santa Isabel, February 2 to 6, and Barcellos, February 10 to 12. On February 13, I arrived at Manaos, and the remainder of the month was devoted to completing computations of data, answering correspondence, undergoing medical examination, and, for a brief time, resting in the hospital.

By March 1, I was sufficiently improved to go in search of stations A and B at Manaos and to investigate transportation to the Rio Branco. Station A could not be located, but station B was occupied March 4 and 5, and preparations were then made for departure for the Rio Branco on March 7. Plans for this departure were too optimistic, however.

At this time of year, with low water, it is a difficult river to reach. For the first ten days of March the mail launch had been ready to set out each day, but it had been unable to proceed. The monthly steamer for Caracarahy also had been delayed for several weeks, and it was now planning to make its last trip of the season on almost any day now.

Meanwhile, I had obtained credentials from the governor which would permit me to continue my observations in Brazil. Finally on March 11, the mail launch was made ready to proceed, and we left Manaos at midnight of that date. Caracarahy was reached March 19, and the station there was occupied the same day. Three more days brought me to Boa Vista, where stations A and B were occupied from March 26 to April 3. The return trip to Manaos was begun April 4 and completed on April 11. Before resuming observations at Manaos to supplement those obtained March 4 and 5, some time was spent arranging for transportation by boat to Santarem, a matter which consumed the better part of two days. Stations A and C were occupied at Manaos on April 15 and 16, and station D was occupied on April 18.

On the following day the journey to Santarem was begun, with plans for stopping at Obidos for reoccupation of stations there. Obidos was reoccupied from April 22 to 25, and then, after two days of waiting for the boat for Santarem and two days of travel, Santarem was reached on April 29, and the observing work at stations A and B was carried out on April 29, 30, and May 1. The opportunity for return to Manaos suddenly presented itself on May 2, and I arrived at that port May 6.

My work on the lower Amazon had now been completed, and I began making plans for going into the Rio Madeira region. Four boats a month went up the Madeira, but not at regular intervals of once a week. Two boats, belonging to rival companies, sailed about the same time approximately every two weeks.

One boat was scheduled to go up the Madeira on May 14. However, a gang of river pirates, 200 strong, had been holding up all shipping on some other river, and the police had taken the Madeira boat to go after them. The next boat, sailing for Porto Velho, was not scheduled to leave until May 20. In the meantime I once more occupied station D at Manaos on May 12 to 15. Finding that the boat for Porto Velho was not to sail until May 23, station B at Manaos was reoccupied on May 20. I left Manaos May 23 and arrived in Porto Velho on May 30, and learned that the weekly train for Guayaramerin left on the first of June, stopping only overnight in Abuna. I therefore immediately chartered an automobile to take me to Abuna, arriving there the evening of May 30. The constant and strong vibration of the car was rather hard on my instruments, loosening several screws, working the magnetometer head loose, and breaking a suspension. May 31 was spent in locating the Abuna station, repairing the instruments, and visiting various local authorities to present my credentials. Occupation of the Abuna station was begun May 31 and finished June 1.

On June 2 I took the train as far as Villa Murtinha (called Villa Bella on the Bolivian side of the river). I had been told that the weekly boat for Riberalta, Bolivia, would make connection with that train, but on arrival in Villa Murtinha I found that the boat would not leave till the down train from Guayaramerin came through two days later. This delay suited me, however, as I was anxious to make a trip to Cachuela Esperanza, and I therefore chartered a launch for that point, arriving the evening of June 2. After the necessary preliminaries had been attended to, I just had time to select and occupy a station and mark it well with a concrete marker before catching the regular boat for Riberalta late on June 4.

In Riberalta I had bad luck with the weather, having clouds day and night, and getting no glimpse of the Sun or stars. But my reoccupation of Sterling's station on June 6 was probably exact, as two of his marks were still there. The station was left permanently marked with a concrete block. Here the station was on land owned by an American mission, and while the missionary was very much interested in my work, he was worried about explaining the marker to local officials until I explained that I had received permission from the authorities to occupy the station.

I finished at Riberalta just in time to catch the return boat, meeting the southbound train at Villa Murtinha on June 9. The following week was spent at Guajara Mirim, on the Brazilian side of the river, and Guayaramerin, on the Bolivian side. At Guajara Mirim, Howard's old marker had been lost, as the grounds had been dug up and turned into a park. My reoccupation on June 10 was probably exact, however, and certainly was not off more than a foot or two. The station was again marked with a concrete block. The president of the municipality assured me that this time the marker would not only be left alone, but would be considered as one of the features of the park.

In Guayaramerin I found that the stations of Schmitt and Sterling could not be reoccupied, since that whole neighborhood had been abandoned and was covered with jungle. Howard's marker was gone, but my reoccupation of his station on June 13 and 14 probably was within 50 feet. As the results seemed somewhat unusual, I established station B about 500 yards west of station A on June 15. I had hoped to establish still another station here, but no suitable site was available. I could find only swampy ground, infested with insects.

On June 17, I departed by train for Porto Velho and from June 20 to 24 occupied stations A and B at that location. Both of Howard's markers were intact, and I obtained exact reoccupations. I had hoped to make additional observations here, and to establish another station on the other side of the river, but the hot and dusty work of observing was irritating to a leg infection I had been suffering from for some time, and I considered it wise to rest until the steamer left for Manaos on June 27. I arrived in Manaos July 1, thus completing my work in the Madeira River region. Manaos was in the grip of an influenza epidemic when I arrived, and I made plans for an early departure for Iquitos, Peru. The first available boat was scheduled to leave July 7, and finally departed on July 9. In the meantime I had become ill with a severe malarial attack, but I was able to leave with the boat.

While en route, a brief stop was made July 14 at Bocca do Jutahy, in Brazil, where a station was occupied, and another brief stop was made at Esperanca, Brazil, on July 18, for another station occupation. Iquitos was reached July 21, and several days were spent presenting credentials to local officials, getting equipment through customs, arranging for boat trip to Yurimaguas, and inspecting sites of former magnetic stations.

Reoccupations of stations A and B at Iquitos were made July 26 to 31. On August 1, as a courtesy to the Prefect of Iquitos, I made observations of the latitude and longitude of the town. Two days were spent buying supplies and arranging for the journey to Yurimaguas which began August 4. My plans called for occupation of several stations while en route.

In Iquitos, I was so badly rushed that I neglected to look at a map before chartering a launch for Yurimaguas. From my instructions, I inferred that Barranca was between Tres Unidos and Yurimaguas. I discovered my error after we had left, and was in some doubt, in view of the shortness of time and my eagerness to reach a better climate, as to whether I should make the side trip to Barranca. After inquiries had been made, it became apparent that Barranca would be the only place on the whole trip where I could get anything resembling a close reoccupation.

During the occupation made at Nauta on August 6 and 7, my feet again became badly infected by insects, exactly as on the Rio Negro. By the time I reached Tres Unidos they were so infected that observation in the hot Sun and with heavy boots was out of the question, and I decided that the rest afforded by a side trip to Barranca was better than fretting at Tres Unidos waiting for my feet to improve. By observing at Barranca August 15 and 16, I got at least one close reoccupation in the region and no time was lost through mere waiting. Returning to Tres Unidos on August 17, I occupied stations A and B on that date and the day following. The trip to Yurimaguas was completed on August 20.

I had a very quiet time during the first few days in Yurimaguas, computing and wishing the infection would leave my feet just long enough to allow me to make observations. By August 24 I felt able to begin observing and stations A and B were occupied August 24 to 26. On Sunday, August 28, I took a plane to Moyobamba, my feet being both so infected that I could not make the hard four-day walk to Lamas necessary on the overland trip. The baggage that I sent ahead overland was not yet there, but it was expected to arrive any day. By making inquiries about the overland route from Yurimaguas to Moyobamba, I found that the first four or five days, covered on foot to Lamas, included a number of river fords that were then over four feet deep. Perhaps it was lucky for my chronometers that I decided to fly, though personally the overland trip would have been very interesting.

The climate of Moyobamba seemed delightful with the exception of a great deal of torrential rain, which was unusual in the "dry" season. No good site for a station appeared at first, and the city seemed almost as crowded for space as Manhattan. I therefore arranged for a mule for August 30 for a good look at the surrounding country, and at some thermal baths about 40 minutes out of town. I called on the prefect on the morning of August 30. The same day I was fortunate enough to meet Admiral Como of the Italian Naval Reserve, who had settled here in a beautiful and secluded spot. He was greatly interested in my work and immediately wanted me to move to his grounds for magnetic work some miles out from town and next to the hot springs. I rode out with him the same afternoon in heavy rain. I inspected the place, found everything to my liking, and got the first hot bath I had been able to get since I was in Porto Rico. The following morning I borrowed peons to carry my instruments out to the Admiral's place. The afternoon of August 30 was spent in clearing the ground for stations B and C. The Admiral was delighted at this help in clearing land that he was slowly turning into pasture.

Magnetic work at stations A, B, and C was begun August 31 and was completed September 5. The work was hampered by several rain storms. No occupation in or near the town was made. I spent September 6 computing and writing letters. My feet and legs had practically healed. All traces of infection were gone.

The baggage that I had shipped overland from Yurimaguas arrived in Moyobamba September 5. Living some miles out, I saddled up in the evening and rode in to Moyobamba; I found everything in good shape. It took 15 days for the baggage to get here, since it had been held up by an Indian festival at Lamas. The festival would have delayed me, too, had I gone overland, as no Indian will move during fiesta time.

Mules from Chachapoyas arrived September 7, and on September 10 my journey to that town was begun, all magnetic work having been finished. Travel to Chachapoyas was slow, owing to difficulties in crossing streams swollen by continuous heavy rains and to the ruggedness of the terrain, and I did not arrive until September 17. Observations at Chachapoyas were made September 18 and 19 and, after a day spent in laying in supplies, the journey to Cajamarca was begun on September 20. Again frequent rains made travel difficult and slow, with the result that I did not reach Cajamarca until September 26. Observations were made at two stations from September 28 to October 1.

An automobile was arranged for on October 2 for the trip to Chilete, and the journey made on October 3. The Chilete station was occupied on October 4. On the following day I traveled by train to Pacasmayo, and there occupied two stations on October 7, 8, and 9.

I left Pacasmayo for Callao, Peru, by steamer on October 10 and arrived in Callao on October 12. I had several things to do in Lima; seeing about the trunk that I shipped from Iquitos, calling on various government officials, ministers, and the Army Geographical Service. On October 14 I went by train to Huancayo, and there intercomparisons were made between my equipment and the observatory apparatus. These observations were made October 17 to 20. After completing necessary computations and a visit to the hospital at Oroya for a physical examination, I returned to Lima on October 25. As no steamer was scheduled to sail north until November 2, the intervening days were spent computing, arranging sailing papers, and answering correspondence. I sailed from Callao November 2, as scheduled; on November 4 I went ashore at Paita and traveled by car to Piura where stations A and B were occupied on November 6, 7, and 8.

Returning to Paita on November 9, I visited the local authorities, and the station there was occupied on November 10. At both Piura and Paita the work was hampered somewhat by the impossibility of setting up the observing tent securely in the loose sand. I left by steamer November 12 and arrived at Guayaquil, Ecuador, on November 13. Several very rainy days were devoted to visits to government officials and to replying to correspondence. On November 17, the weather was good enough to permit occupying the Guayaquil station after which came the journey by train to Riobamba on November 18, and then to Quito on the following day.

Here I visited the United States legation and the Ecuadorian Army Geographical Service. Stations A, B, and C, and a station designated "secondary," were occupied

November 22 to 28, with parts of these days devoted to instructing officers of the Geographical Service in the use of magnetic instruments.

Several suspension-fibers broke in the course of the work at Quito and the last one on hand was installed there to complete the work. Apparently some of the spools of suspension-fiber had become corroded, making the fibers break easily. After two days of instruction to the Army officers in methods of computing the results of magnetic observation, the return journey to Guayaquil through Riobamba was made on November 30 and December 1.

The station at Guayaquil, occupied on November 17, was reoccupied on December 6 and 7, but frequent rains prevented a full program of observations. I sailed December 8 for Buenaventura, Colombia, and the steamer arrived at this port December 13. In response to the urgent cable I had sent from Quito in November, a new supply of suspension-fibers reached me there.

The 1923 station at Buenaventura could not be located, as the neighborhood had all been built over. A new station was accordingly chosen and occupied on December 14. On December 15, a trip was made to Cali and though the 1923 station was lost here, as in Buenaventura, a new station was chosen not more than 35 yards from the old one. The new station was occupied December 17. Frequent rains at both Buenaventura and Cali were somewhat troublesome, but the fact that they were confined to the afternoon hours was taken into consideration in the observing program.

The journey to Bogotá was made December 18 and 19. Some delays were encountered there in obtaining necessary identification papers and local credentials from the authorities. However these matters were arranged after a few days, but the weather became very uncertain, with a great amount of rain. December 23 began favorably, and a visit to stations A and B was made. Both were found practically flooded, but a close reoccupation of station B was made in heavy mud. Observations were soon abandoned, however, as a magnetic disturbance appeared to be in progress. December 24 was magnetically disturbed also and on the next day it rained heavily. On December 26, a satisfactory occupation of station B was obtained but, because it was necessary for me to leave promptly for the coast to catch a steamer, station A was not occupied.

Departing from Bogotá on December 27, I occupied a station at Puerto Berrio on December 29 and 30. The steamer from this port reached Barranquilla on January 4.

After visits to government officials and arranging for my departure for New York, an occupation of the Barranquilla station was made January 8 and a station at Puerto Colombia was occupied on January 9 and 10.

On the afternoon of January 10, I began the return trip to New York, arriving there January 18, 1933, seventeen and one-half months after my departure in August, 1931. I had traveled approximately 20,000 miles and for transportation had used a great variety of conveyances, including steamers, launches, canoes, mules, horses, railroads, passenger automobiles, and trucks. Eighty-six field stations had been occupied, not including the occupation at the Huancayo Magnetic Observatory, where intercomparison observations had been made.

C. T. KWEI, ON MAGNETIC WORK IN CHINA, JULY, 1932, TO AUGUST, 1935

During the interval 1932 to 1935, I collaborated with Mr. F. C. Brown in making magnetic observations at various field stations during the summers of 1932, 1933, and 1935, and also at other times at Wuchang, where my institution, the Central China College, is located. Table 18 lists the stations occupied.

Accompanied by Mr. F. C. Brown I left Hankow on July 4, 1932, for Chengchow, thence by rail to Tungkwan. There was little mishap except that mountain rains had washed out the rails at one point. At Tungkwan the city was under quarantine for cholera. However, the garrison commander, who also acts as the highest civil officer, gave us a permit to proceed by bus to Sian. Our passports were issued by the Academia Sinica through the good offices of Dr. S. L. Ting, Director, National Research Institute of Physics, who proved of invaluable assistance. After five days in Sian I returned by mail bus to Tungkwan, where poor roads delayed us a day, and then proceeded to Shenchow, where I reoccupied the former station and established a new one likely to be free from future changes in the city. At Chengchow we reoccupied the station Chengchow B.

From Chengchow I went to Changte, Honan Province, now known as Anyang. This city is noted for its archeological findings relating to the Shang Dynasty, 1766-1154 B.C. It has been suggested that the buildings were aligned in a manner indicating a knowledge of methods for determining geographic or magnetic north and south during this period. Difficulty was experienced in obtaining a close reoccupation of the station of 1907. I also established a new station on the grounds of the Canadian Presbyterian Mission.

At Taiyuanfu a building occupied the site of the station of 1907, and a new station was established nearby.

From Taiyuanfu we returned to Shihkiachwang, where a new station had to be established because the 1907 station was only 60 yards from a railroad.

At Tinghsien or Tingchowfu we were reminded of the experiments in mass education carried out by Yen and his colleagues. We established a station in the western yard of the Mass Education Hospital.

At Peiping a new station, Peiping C, was established on the grounds of the Tsing Hua University, five miles from Peiping.

During July, 1933, stations Ichang, Chungking, Fowchow, Wanhsien, and Kweichowfu were occupied.

In 1934, a triangular route was followed along which were occupied the stations Hengchow, Shenchow, Canton, Wuchow, Nanning, and Kweilin. Close reoccupations were secured at Hengchow, Shenchow, and Wuchow. At Canton and Kweilin the stations of 1935 were within 100 meters of the previous stations. Because of buildings and a new wireless station near the old site of the station at Nanning, a new station was established about four kilometers northeast of the station of 1917.

It is a pleasure to acknowledge my indebtedness to Dr. Ting of the Academia Sinica for providing me with a passport, to Dr. W. T. Chen and Dr. A. R. Knipp of Lingnan University, to Mr. S. C. Ho, chief auditor of the Kwangsi Provincial Government, to Dr. M. H. Ma of the Kwangsi Meteorological Station, and to the authorities of Kwangsi University for providing accommodation, time signals, and other very helpful services.

Table 18

No.	Station	Date	Latitude		Longitude East	
			°	'	°	'
		1932				
1	Wuchang, Hupeh	Jan 2	30	33.7 N	114	20
2	Wuchang, Hupeh	Feb 11, 13, 26	30	33.7 N	114	20
3	Wuchang, Hupeh	Mar 29	30	33.7 N	114	20
4	Chengchow, A, Honan	Jul 5	34	45.2 N	113	43
5	Sian, A, Shensi	Jul 8, 11, 12	34	16.3 N	108	56
6	Sian, B, Shensi	Jul 9	34	16.4 N	108	59
7	Shenchow, B, Honan	Jul 16, 18, 19	34	47.6 N	111	11
8	Shenchow, A, Honan	Jul 17	34	48.2 N	111	11
9	Changte, A, Honan	Jul 21	36	06.5 N	114	23
10	Changte, B, Honan	Jul 22	36	06.4 N	114	21
11	Taiyuanfu, Shansi	Jul 25, 26	37	51.9 N	112	43
12	Shihkiachwang, A, Hopei	Jul 28, 29	38	02.7 N	114	30
13	Tinghsien (Tingchow), Hopei	Jul 30, 31	38	30.6 N	115	05
14	Peiping, C, Hopei	Aug 3, 4	40	00.6 N	116	18
15	Wuchang, Hupeh	Oct 22	30	33.7 N	114	20
16	Wuchang, Hupeh	Nov 5, 19	30	33.7 N	114	20
17	Wuchang, Hupeh	Dec 17, 31	30	33.7 N	114	20
		1933				
18	Wuchang, Hupeh	Jan 2, 31	30	33.7 N	114	20
19	Wuchang, Hupeh	Feb 25	30	33.7 N	114	20
20	Wuchang, Hupeh	Mar 4, 18	30	33.7 N	114	20
21	Wuchang, Hupeh	Apr 15, 22	30	33.7 N	114	20
22	Wuchang, Hupeh	May 2, 30	30	33.7 N	114	20
23	Ichang, C, Hupeh	Jul 3	30	42.5 N	111	21
24	Chungking, B, Szechwan	Jul 9-14	29	34.6 N	106	37
25	Fowchow, Szechwan	Jul 15, 17	19	42.5 N	107	24
26	Wanhsien, B, Szechwan	Jul 24-26	30	48.7 N	108	18
27	Kweichowfu (Tengchieh), B, Szechwan	Jul 27, 28	31	02.8 N	109	25
28	Kweichowfu (Tengchieh), A, Szechwan	Jul 29	31	01.0 N	109	22
29	Wuchang, Hupeh	Oct 28	30	33.7 N	114	20
30	Wuchang, Hupeh	Nov 4	30	33.7 N	114	20
31	Wuchang, Hupeh	Dec 2, 9	30	33.7 N	114	20
		1934				
32	Wuchang, Hupeh	Feb 8	30	33.7 N	114	20
33	Wuchang, Hupeh	Mar 10	30	33.7 N	114	20
34	Wuchang, Hupeh	Jun 26	30	33.7 N	114	20
35	Wuchang, Hupeh	Jul 25	30	33.7 N	114	20
36	Wuchang, Hupeh	Aug 30	30	33.7 N	114	20
37	Wuchang, Hupeh	Sep 8	30	33.7 N	114	20
38	Wuchang, Hupeh	Dec 15	30	33.7 N	114	20
		1935				
39	Wuchang, Hupeh	Jan 23, 24, 26	30	33.7 N	114	20
40	Wuchang, Hupeh	Mar 23	30	33.7 N	114	20
41	Wuchang, Hupeh	Jul 4	30	33.7 N	114	20
42	Hengchow, Hunan	Jul 8, 9, 10	26	55.2 N	112	35
43	Shiuchow, Kwangtung	Jul 13, 15	24	47.4 N	113	35
44	Canton, C, Kwangtung	Jul 17-19	23	06.3 N	113	18
45	Wuchow, Kwangsi	Jul 22-24	23	28.4 N	111	16
46	Nanning, Kwangsi	Jul 28-30	22	50.2 N	108	20
47	Kweilin, Kwansi	Aug 2, 3	25	17.7 N	110	16

P. G. LEDIG, ON MAGNETIC WORK IN SOUTH AMERICA, FEBRUARY TO SEPTEMBER, 1933

In accordance with instructions from the Director dated November 16, 1932, I completed the transfer of the Huancayo Magnetic Observatory to Dr. J. E. I. Cairns on December 9, 1932, and the following day took the train for Lima. The equipment for magnetic field observations had been brought from Washington by Mr. H. W. Wells on his arrival in Callao on December 2, and had been stored since that time in the Bolivar Hotel in Lima. The equipment consisted of CIW magnetometer inductor No. 26, observing tent No. 62, chronometers Nos. K258 and D50097, and Elgin watch No. 116.

Table 19 lists the magnetic stations occupied and their positions.

In Lima I had to obtain a new passport and the necessary visas on it and follow up the free entry through customs of observatory equipment. I was not able to leave Callao for the south before the Grace Line steamer *Santa Clara* sailed on December 30.

A letter from the Chief of Customs in Lima, obtained for me through the courtesy of Sr. L. T. Cobos of the Callao customs house, made it a simple matter to get my equipment through customs in Mollendo on my arrival there on New Year's day; within an hour or so after landing, all of the equipment had been delivered at the hotel. This was my first magnetic field station, and I began work with considerable misgivings. My only work with a field-instrument had been a few practice observations in 1930, and my recollections of the details of manipulation of the instrument and the setting up of the tent, galvanometer, etc., were badly blurred by the three years that had passed. Fortunately, the lack of shipping on this coast gave me two weeks at this station, and I was able to familiarize myself again with the necessary operations, if not at my leisure, at least without undue pressure from lack of time. Station A of 1924 could not be reoccupied but a close reoccupation of station B was made. The station was carefully marked twice; the first time mischievous boys destroyed the top of the marker, which was then remade and the whole covered with a large stone for reasons of safety.

Table 19

No.	Station	No.	Latitude	Longitude East
		1933	° ′	° ′
1	Mollendo, Peru	Jan 3- 5	17 01.8 S	287 59
2	Santiago, Chile	Feb 1	33 27.0 S	289 18
3	Puerto Montt, A, Chile	Feb 23, 25	41 29.8 S	287 03
4	Puerto Montt, B, C, Chile	Feb 27-Mar 2	41 28.7 S	287 03
5	Magallanes, C, Chile	Mar 15, 21, 22	53 08.9 S	289 06
6	Magallanes, A, B, D, Chile	Mar 16, 17, 20	53 11.0 S	289 03
7	Magallanes, E, Chile	Mar 27	53 08.9 S	289 06
8	Santa Cruz, A, Argentina	May 16, 21	50 00.9 S	294 28
9	Santa Cruz, B, Argentina	May 22	50 01.6 S	294 29
10	Puerto Deseado, A, Argentina	Jun 2, 8, 10	47 45.0 S	291 08
11	Puerto Deseado, B, Argentina	Jun 3	47 45.0 S	291 08
12	Colonia Las Heras, Argentina	Jun 5	46 32.0 S	291 03
13	Dolavon, Argentina	Jun 25, 27	43 18.3 S	294 17
14	Puerto Madryn, A, Argentina	Jun 30, Jul 2	42 45.2 S	294 57
15	Puerto Madryn, B, Argentina	Jul 1, 2	42 45.3 S	294 58
16	Pilar, Argentina	Jul 13	31 40.1 S	296 07
17	Goyaz, A, Brazil	Aug 23, 25, 26	15 56.6 S	309 55
18	Goyaz, B, Brazil	Aug 24	15 56.4 S	309 53
19	Annapolis, Brazil	Aug 29	16 19.2 S	311 08
20	Catalão, A, B, Brazil	Aug 31, Sep 1	18 10.8 S	312 07
21	Catalão, C, Brazil	Sep 2	18 09.9 S	312 04
22	Araguari, Brazil	Sep 4	18 38.3 S	311 50

The trip to Valparaiso from Mollendo was made in the Grace Line ship Santa Maria. On my arrival in port no difficulty at all was made by the customs authorities, and everything passed through with only a very cursory examination of my personal baggage and one or two boxes of the scientific equipment. When calling for my mail at the United States consulate, I learned that I had been expected two weeks earlier and that representatives from the Chilean Navy, the Meteorological Office, the Scientific Society of Chile, and the American consulate, had come aboard to receive me and had been surprised because I had not arrived. A personal letter from a member of the embassy staff in Lima had given the impression to the Valparaiso consulate that I was coming straight through to Valparaiso when I left Lima on December 30, and this had caused the mistake. The director of the local meteorological office, Sr. Ciro Araya, and the Valparaiso representative of the Scientific Society of Chile, Sr. Carlos Briseno, were more than courteous to me during my stay here and arranged several enjoyable short sightseeing trips. The staff members of the American consulate were also very kind and helpful.

Computations for the Mollendo magnetic cahier, which had given me some trouble, were completed here and sent in to the Department. I also had several items of my equipment repaired before leaving Valparaiso.

I traveled to Santiago by one of the best railways I have ever had occasion to use; electric trains, splendidly equipped, make the 116-mile journey over the divide in about three hours. After leaving Valparaiso the train passed pleasant suburban towns and rich fruit farms in the irrigated valleys, and then crossed a barren and rocky divide. On the other side of the divide we came to the broad, irrigated valley surrounding the city of Santiago, a typical South American large city. I was greatly interested to note placer mining for gold along one of the small streams.

I was cordially greeted by Sr. Valensuela, Director of the Meteorological Office, when I called, and he gave me every facility to assist me in reoccupying the Quinta Normal magnetic station, marked clearly by Mr. J. W. Green in 1932. He also informed me of the polar year station in Magallanes and after some consultation with him I arranged to take the Chilean Kew magnetometer and Schulze earth inductor to Magallanes for use of the observer there. The Department also agreed to send an astatic galvanometer by air mail for use with the latter.

I arrived in Puerto Montt on the afternoon of February 14 after an all night and day journey from Santiago by train. The journey was not rapid, but quite comfortable on the through trains which made the journey three times a week; the Pullman berths were clean, and the dining car served good meals. During the night the train passed over a high semi-desert grazing area, and the following morning over rolling country largely devoted to wheat growing. Later we passed through increasingly productive regions; territory that had in times past been virgin forest and was slowly being cleared, to become part of the agricultural domain of Chile. Puerto Montt is a flourishing town of about 15,000 inhabitants situated in a sheltered bay of the Gulf of Reloncavi, with clean graveled streets and neat homes; German colonists in this part of Chile have made it notable for its thrift and agricultural advancement.

On visiting the site of the 1924 magnetic observations on Tenglo Island, I found that large quantities of magnetic material used in the construction of new docks on the mainland were collected in the near vicinity of the old stations. Moreover, the removal of the old buildings in the vicinity and digging for sand and gravel had obliterated all marks which might be used in locating station sites very accurately. Only a rough estimate of their position could be made by the use of information obtained from old residents of the neighborhood. Practical reoccupation was made at a new station less than 100 meters to the southwest of the old stations in order to transfer values to a new station site in Puerto Montt itself. The station was chosen on a tract of land overlooking the springs which supply water to the town, which has been made into a reservation to prevent the pollution of the water supply. Two new stations were established on this site; one of them was occupied as a Class III station and the other as a Class I station.

I was given every possible assistance by the local authorities and the naval officers on duty in this port. I wish to express especial appreciation for the assistance and encouragement of Padre del Piano, in charge of the meteorological station in Puerto Montt and instructor in the Jesuit School of San Xavier, and to the officers on board the lighthouse tender Sobenes who obtained time signals for me several times with the ship's radio receiver. The weather in this port was unpleasant and cold during most of my stay, and I almost despaired of getting solar observations.

I sailed south to Magallanes on the Alejandro on March 4, accompanied by Sr. Eric Trollund of the Chilean Meteorological Office who had come from Santiago with the instruments for the polar year station in Magallanes and also was to collaborate with me in the work to be done there. Except for the first day on the smooth waters near the large island of Chiloe, the weather was cold, stormy, and generally unpleasant, and I was very seasick one day while we were out in the open sea and markedly uncomfortable during the other days of the voyage, even in the relatively protected channels of the inside passage. I was glad to see the bleak cold shores of Magallanes when we arrived on the evening of March 9.

I occupied five magnetic stations in Magallanes and supervised the construction of a pier and shelter for the polar year absolute magnetic observations. I also assisted in the reinstallation of the polar year variometers, and trained the observer, Sr. U. Matassi, in making magnetic observations. Instrumental intercomparisons were made with the Chilean magnetometer, giving provisional constants for its use.

The approach of southern winter made it necessary to leave Magallanes on May 13 to occupy the stations in Argentinian Patagonia. I traveled to Santa Cruz by automobile.

No difficulty was made by the inspectors on passing the Argentinian border when I presented a copy of a telegram from the Minister of Exterior Relations urging all possible assistance in my work. We reached Rio Gallegos on Saturday evening, and the next day I had an opportunity to visit the site of the 1926 magnetic station. It was found to be perfectly satisfactory for occupation, but because of its nearness to Magallanes, where so full a program of work had been done, it was deemed wiser to hurry on to Santa Cruz rather than wait for better weather here.

In Santa Cruz I reoccupied both stations A and B as Class II and III stations, respectively. Several days of wind, rain and bitter cold prevented completion of the work in time to go on to Puerto Deseado on the Comodoro Rivadavia on May 19 as I had planned. I suffered very much from the penetrating cold in this place, not only in the field but also in the hotel, which I thought inadequately heated.

I took the weekly plane north and arrived in Puerto Deseado on May 24 with the magnetometer, tripod, and handbags; the tent followed by water on the next ship north and reached me eight days later. Though there was a little rain during my stay here, I was much troubled by the strong winds and bitter cold. I found the local officials exceedingly pleasant and desirous to help; but I was informed about ten days later that in order to do my work in Argentina I was obliged to have what is called a "guia de circulacion" (permit allowing free movement in the country.) For this I was obliged to hire a customs broker to represent me and sign jointly with me a note covering the duty on the equipment carried.

I obtained an exact reoccupation of Santa Cruz A of 1925, and established a new station, B, in the line of the main azimuth, a little over 200 yards farther to the northwest. When the tent arrived from the south I traveled by the weekly train to Colonia Las Heras, where I made a proximate reoccupation of the 1925 station in a day. I was very fortunate in being able to finish my diurnal-variation observations in Puerto Deseado on June 8 and 10, in spite of cold and a strong wind, for beginning with June 11 there was a week of fog, rain, sleet, wind, and cold, which finally terminated in a heavy snowfall on the last night I was in the port.

I sailed for Puerto Madryn on the Asturiano, and when it stopped in Comodoro Rivadavia the following day, I went ashore and examined the station site there, which was found satisfactory for future reoccupation. We reached Puerto Madryn on June 21 after two days of storm which kept me confined to my cabin with seasickness most of the time. Here the weather was milder, and I began to feel that I had made secure my escape from the cold of southern Patagonia. As soon as I was able to get some funds on my letter of credit in Trelew, some 40 miles from Madryn by rail, I went on to Dolavon, about 30 miles farther up the Chubut River Valley from Trelew. Here I obtained a close reoccupation of the station of 1919 after repairing and adjusting the theodolite, which had been blown over and injured in a severe windstorm two days before.

A new station was then established at Puerto Madryn replacing the stations of 1925, one of which was inside the patio of a new house and both of which had been rendered unfit for reoccupation by the magnetic material in the city water tank and a stock of iron water pipe near the site. Another new station was established near the cemetery, about a kilometer farther out from the town. I was able to finish both stations in time to catch the Jose Menendez on July 3 after completing the marking of the stations. Again we had rough weather; we reached Buenos Aires in a thick fog.

The "guia de circulacion" for my equipment which I had obtained in Puerto Deseado was found to have been made with some slight error, and I had considerable difficulty with the customs inspectors. After completing customs arrangements, I went on to the magnetic observatory in Pilar. I found Sr. Lutzow-Holm, in charge of the observatory there, discouraged by the prospect of a cut in the allotments for the magnetic work for the next year, but also highly pleased by a letter from the Director of the Department praising the work done there. Under his direction the magnetic work had been done carefully and well. After two days in Pilar, during which a good set of earth inductor intercomparisons was completed, I returned to Buenos Aires. Two days later I left by the night ferry for Montevideo.

I found Montevideo to be the most delightful city I had visited, with hospitable people interested in our work. I at first left all my equipment in storage in the customs but later was given special permission to remove it. I learned that I should not be able to sail for Rio de Janeiro on July 22 as I had expected, and was greatly pleased to comply with the request of the Director of the Naval School, Captain de Fragata Hector Luisi, to give a talk on the Department's work and a demonstration of the magnetic equipment before a group of military and naval officers at the Naval School. I also talked one afternoon to a group of students brought together at the Y. M. C. A. School, giving a description of our work and instruments to about 25 young men, and on another day spoke briefly to members of the American Club. I was greatly pleased by the interest shown in the magnetic work by the Naval School, the Hydrographic Office, and the Military Geographical Institute.

I left Montevideo by steamer on July 27 and reached Santos on July 30. Here I was informed by the ship's purser that instead of going on to Rio de Janeiro that night the ship would stay over for two days. Since I had already suffered many delays, I hurried ashore, got my landing card and passport checked by the port doctor and the police authorities, and took the train for São Paulo. That night I went on to Rio de Janeiro by train arriving there August 1.

During my stay I made two visits to the National Observatory where I was kindly received by the Director, Dr. Sodre de Gama, and by the chief of the magnetic division, Dr. Alix Lemos. They expressed their appreciation of the Department's work and assistance. I also spent one day in a visit to the magnetic observatory in Vassouras, where I had several interesting and pleasant hours with Sr. J. C. Castro, then in charge of the observatory. I had been informed by the American Embassy on my arrival in Rio de Janeiro that I should probably have to obtain an official permit from the government to make the expedition into the State of Goyaz, and was faced with a long delay while the necessary formalities were completed, but I was finally enabled to get a special permit through Dr. Souza's urgent solicitation.

I had been informed by the Brazilian Consulate in Buenos Aires that I should be able to enter the interior and travel to Goyaz directly from Rio de Janeiro, but I found on arriving in the capital that, though it was possible, it would be less expensive both in time and money to return to São Paulo and go on into the interior from there.

The railroad from São Paulo to Campinas, where it was necessary to change trains on account of a change in the rail gauge, was almost luxuriously equipped, and the night train from there to Ribeirão Preto has comfortable, though not luxurious sleeping compartments. Beyond this point the trains travel only by day.

The dry season begins about April and lasts until September. The grass is then scorched and dry from heat, and billows of dust arise behind any moving vehicle. The fine red dust sifts through every opening, even soiling clothes in a closed handbag. After a day on the train to Araguari, I spent two nights and a day there while I waited for the observing tent to catch up with me, and then went another day's train journey to Leopoldo Bulhões, the present end of the railroad.

At Leopoldo Bulhões I found the weekly bus had already gone, and that there would not be another for six days. I was therefore obliged to travel three days by freight truck to Goyaz instead of making the journey in one day as I might have done in the bus. At Goyaz I occupied stations A and B, of 1925. I marked them both with permanent markers to make their relocation and occupation easier for future observers.

From Goyaz I returned to Annapolis by auto stage in one day, and here established a new magnetic station to take the place of Bellavista. This was done because Bellavista is no longer on the main road into the interior, and there is no regular automobile service to it. The magnetic station at Annapolis was established on the municipal flying field about two kilometers north of the town.

From Annapolis I went that evening by automobile to Leopoldo Bulhões in order to catch the early morning train that would take me to Goiandira where I had to change to an afternoon train on the branch line to Catalão. At Catalão I was unable to reoccupy either of the 1925 stations exactly, but occupied two new stations well within 30 meters of them both. I also established a new station, station B, in an open field near the cemetery for future reoccupation.

At Araguari, where I had to stop overnight in a hotel between trains, I stayed over one day and occupied a station about 40 meters from the station of 1915. From here I went directly to São Paulo, which I reached on September 6, just three weeks after I had left it to begin the trip to Goyaz. The following day I went on to Santos. I sailed from Santos on September 13, and landed in New York on September 28. The following day I reported at the Department in Washington.

I wish to acknowledge again my appreciation of the assistance rendered me in this work by various persons mentioned in this report. I also am greatly indebted to numbers of others, contact with whom was made in either an official or private capacity, or both, who gave me kind assistance and encouragement here and there throughout my journey, but whom space prevents me from naming separately.

From the time I left the Huancayo Magnetic Observatory until I reported to the Department in Washington was 291 days, and during this time I traveled a total distance of 15,271 miles, 10,584 by ship, 4,005 by rail, 494 by automobile, and 188 by plane. Twenty-five magnetic stations and two magnetic intercomparison stations were occupied.

R. H. MANSFIELD, ON MAGNETIC WORK IN AFRICA, MAY, 1934, TO JUNE, 1936

The expedition served the dual purpose of accumulating data on magnetic secular variation by measurements at field repeat-stations and of intercomparison of magnetic instruments at certain observatories en route.

With field equipment brought from Peru (via Valparaiso, Buenos Aires, and Rio de Janeiro) to Cape Town, South Africa, an intercomparison of instruments had been made at the University of Cape Town Observatory, and field repeat-stations near Cape Town had been reoccupied at the end of the preceding report year. During the interval July 1, 1934, to June 30, 1935, this work was continued by the making of further field measurements in the Union of South Africa, Portuguese East Africa, Southern Rhodesia, Northern Rhodesia, Zanzibar, Tanganyika, Uganda, Kenya, Aden (Arabia), Anglo-Egyptian Sudan, Egypt, Libya, Tunisia, and Algeria. At the end of the report year, I was on my way to Germany for magnetic intercomparisons at Niemegk. These were to be followed by intercomparisons at Abinger, England, and at Washington.

My instrumental outfit consisted of CIW magnetometer and inductor No. 16 and incidental equipment for all measurements made through July, 1934, and of CIW magnetometer and inductor No. 18 for subsequent observations. Pocket chronometers D50107 and K260 and Elgin watches 123 and 109 were used throughout, as was tent 56.

Table 20 lists the stations occupied on the expedition.

Table 20

No.	Station	Date	Latitude	Longitude East
		1934	° ′	° ′
1	Cape Town Observatory, Union of South Africa	May 28-Jun 16	33 57.3 S	18 28
2	Cape Town, E, Union of South Africa	Jun 19-21	33 56.0 S	18 29
3	Cape Town, F, Union of South Africa	Jun 23	33 56.0 S	18 29
4	Orange River, A, Union of South Africa	Jul 2- 5	29 40.0 S	24 12
5	Orange River, B, Union of South Africa	Jul 9-11	29 40.3 S	24 12
6	East London, A, Union of South Africa	Jul 17-24	33 00.3 S	27 56
7	East London, B, Union of South Africa	Jul 25, 26	33 00.0 S	27 56
8	Durban (The Bluff), Union of South Africa	Jul 31-Aug 2	29 52.6 S	31 03
9	Tabora, A, Tanganyika	Aug 29, 30	5 01.0 S	32 49
10	Tabora, C, Tanganyika	Aug 27, 28	5 01.2 S	32 50
11	Tabora, B, Tanganyika	Aug 31	5 01.8 S	32 50
12	Kampala, Uganda	Sep 6-10	00 20.0 N	32 35
13	Entebbe, Uganda	Sep 11	00 04.0 N	32 28
14	Nairobi, Kenya	Sep 17-22	1 16.1 S	36 46
15	Nairobi, B, Kenya	Sep 19	1 17.3 S	36 49
16	Mombasa, Kenya	Sep 27, 28	4 03.2 S	39 41
17	Zanzibar, B, Zanzibar	Oct 2, 4	6 15.0 S	39 13
18	Zanzibar, A, Zanzibar	Oct 3	6 10.2 S	39 11
19	Dar es Salaam, Tanganyika	Oct 6	6 49.0 S	39 19
20	Mozambique, B, Portuguese East Africa	Oct 13-19	15 01.8 S	40 44
21	Beira, B, Portuguese East Africa	Oct 29, 30	19 49.9 S	34 50
22	Beira, D, Portuguese East Africa	Oct 31, Nov 1	19 49.7 S	34 50
23	Beira, E, Portuguese East Africa	Nov 2	19 49.2 S	34 51
24	Lourenço Marques, A, Portuguese East Africa	Nov 12, 14	25 58.1 S	32 36
25	Lourenço Marques, B, Portuguese East Africa	Nov 26, 28	25 57.8 S	32 36
26	Lourenço Marques, C, Portuguese East Africa	Nov 29, 30	25 57.7 S	32 36
27	Lourenço Marques, D, Portuguese East Africa	Nov 29, Dec 1	25 57.7 S	32 36
28	Pessene, B, Portuguese East Africa	Dec 4, 5	25 41.5 S	32 21
29	Pessene, C, Portuguese East Africa	Dec 6	25 41.5 S	32 21
		1935		
30	Pretoria, B, Union of South Africa	Jan 24	25 45.0 S	28 10
31	Pretoria, C, Union of South Africa	Jan 25	25 45.0 S	28 10
32	Pretoria, D, Union of South Africa	Jan 28	25 44.9 S	28 16
33	Pretoria, E, Union of South Africa	Jan 30	25 44.9 S	28 16
34	Johannesburg, Union of South Africa	Feb 14	26 21.7 S	27 34
35	Mafeking, A, Union of South Africa	Feb 18, 19	25 51.8 S	25 39
36	Mafeking, B, Union of South Africa	Feb 20	25 51.8 S	25 39
37	Bulawayo, A, Southern Rhodesia	Feb 26-28	20 09.0 S	28 36
38	Bulawayo, C, Southern Rhodesia	Mar 2, 3	20 08.9 S	28 35
39	Bulawayo, D, Southern Rhodesia	Mar 5	20 09.8 S	28 35
40	Bulawayo, E, Southern Rhodesia	Mar 6	20 07.9 S	28 36
41	Victoria Falls, A, Southern Rhodesia	Mar 11-14	17 55.9 S	25 51
42	Victoria Falls, B, Southern Rhodesia	Mar 13, 14	17 55.9 S	25 51
43	Livingstone, A, Northern Rhodesia	Mar 19-22	17 51.2 S	25 52
44	Livingstone, B, Northern Rhodesia	Mar 23	17 52.5 S	25 52
45	Salisbury, A, Southern Rhodesia	Mar 27	17 49.5 S	31 03
46	Salisbury, B, Southern Rhodesia	Mar 28	17 48.2 S	31 04
47	Salisbury, D, Southern Rhodesia	Mar 29	17 51.4 S	31 03
48	Aden, B, Arabia	Apr 27	12 49.3 N	44 59
49	Aden, C, Arabia	May 2- 5	12 49.5 N	45 01
50	Port Sudan, Anglo-Egyptian Sudan	May 10, 11	19 37.4 N	37 14
51	Suez, A, Egypt	May 21, 22	29 57.9 N	32 33
52	Suez, C, Egypt	May 23, 24	29 56.4 N	32 29
53	Tripoli, A, Tripolitania	Jun 6	32 53.9 N	13 12
54	Tripoli, B, Tripolitania	Jun 7	32 51.7 N	13 11
55	Tunis, A, Tunisia	Jun 15, 17	36 45.4 N	10 07
56	Tunis, B, Tunisia	Jun 18	36 45.4 N	10 06
57	Algiers, O, Algeria	Jun 25, 26	36 48.1 N	3 02

Early in July, 1934, I began work in chilly midwinter on the open semi-desert plateau at Orange River, Cape Province, South Africa. Two stations occupied here were admirably free from artificial disturbance, and promised to remain excellent repeat-stations. Shelter was obtained with a railroad laborer. Except for difficulty with high winds, the work went on in a satisfactory manner. It should be noted at the outset that the principal difficulty at most of the African stations was due to wind, a fact which need not be repeated in dealing with the various stations separately.

From Orange River, I retraced my way to De Aar, and thence I went southeast to the coast at East London. Though much of the country here traversed is unproductive, the whole area is rich in associations with the Boer War and recalled vivid scenes to the veteran who happened to occupy the same compartment with me on the train. Having reached East London, it appeared that winter had been left behind. Certainly cold weather was not a difficulty at later African stations. Again two stations were occupied with satisfactory results and were more substantially marked for future use. A siege of rainy weather was experienced unprecedented for the time of year at East London. I next embarked for Durban, being put aboard the ship in a basket drawn up by cable.

At Durban the old station was found to be impracticable due to highway construction. Observations were taken as near to the old point as possible, but no suitable place was found for the establishment of a new station. It was concluded that future work could more profitably be done at Gingindhlovu some miles distant along the coast. As this station had been occupied in 1932 by Grindley, and its relation to the Durban station had been established at that time, no observations were taken at Gingindhlovu in 1934.

Lourenço Marques was the next locality to be visited and it was reached early in August. The sites listed included the magnetic station at the Observatorio Campos Rodrigues and a field station some miles west at Pessene. The observatory station was selected first and preparations were made for observations there. Most unfortunately, the shelter over the observing pillar, an arrangement with four large cement columns topped by canvas, collapsed for no obvious reason just as the magnetic instruments were being set up under it. The central base of the magnetometer was caught in the fall and thereby was damaged to such an extent that it could not again be used. This emergency made it necessary to secure another instrument, and as the nearest usable instrument was CIW magnetometer and inductor No. 18 on loan in Tanganyika, it was necessary to proceed immediately to Tanganyika to get this. A voyage of nine days up through the Mozambique Channel brought me from Lourenco Marques to Dar es Salaam, Tanganyika. Another day of travel by rail through the empty bush veld brought me to Tabora, the administrative center of Western Tanganyika. Here instrument No. 18 was obtained at the meteorological station.

It now appeared desirable to finish the observations in East Africa and to proceed southward, observing on the way until all South African stations had been occupied before proceeding to the North African stations. Since I was in Tabora, the stations there were visited next.

At Tabora, three stations were occupied. Two of these were old CIW stations, both now unsuitable, while the third had been established by the British East African Meteorological Service. I was very cordially received in Tabora and was glad of the opportunity to stay at the meteorological station with Mr. Grinsted, the officer in charge. It might be recorded that on the floor of the veranda of the house occupied by Mr. Grinsted, and beside the bed I slept in, was the skin of a lion which not long ago had been shot at that precise spot. In East Africa, one expects various creatures in one's house.

From Tabora, I next sought to reach Nairobi. The best way from Tabora to Nairobi is via Lake Victoria, and this route was accordingly chosen. A trip of several days across the western side of Lake Victoria next brought me to Kampala, Uganda. Opportunity was taken here to observe at the new pillar erected by the British East African Meteorological Service at Kampala, and a connection with previous observations in the regions was established by reoccupying the old CIW station at Entebbe. Mr. Omond, officer in charge of the Kampala Meteorological Station was kind enough to quarter me in his house and to provide needed transportation around Kampala and Entebbe. Magnetic results were satisfactory here, and the trip was continued to Nairobi.

The rail journey from Kampala to Jinja was through cultivated areas alternating with dense jungle and papyrus swamps and was particularly notable for the view of the official source of the Nile, lovely Ripon Falls, near Jinja. Beyond Jinja, the line climbed to the high plateau of West Kenya and from this region to Nairobi afforded interesting mountain and lake scenes, while the natives decorated with scars, paint, and large ear-inserts gave added color. During this journey, the train crossed the equator three times.

In Nairobi, Mr. Walter, Director of the British East Africa Meteorological Service received me and made all arrangements necessary for the magnetic work, very kindly offering board and transportation as well. One of the old CIW magnetic stations was reoccupied here, and observations, including diurnal variations, were taken in the well-designed nonmagnetic hut erected by Mr. Walter on the Mission grounds nearby.

Proceeding from Nairobi to Mombasa, I found the route along the edge of the large game reserve to be interesting. Hundreds of animals of all sorts were to be seen by the way. In Mombasa, the old CIW station proved satisfactory, and after a short stay, I embarked for Zanzibar.

At Zanzibar, the CIW station of 1921 was readily reoccupied, though it was found necessary to rope off the field and maintain a detachment of police to restrain the curious during part of the work. The new pillar behind the harem of the old Sultan's Palace at Chukwani was found to be a particularly suitable magnetic station and was also occupied. Zanzibar is probably the most picturesque of all the East African ports but hotel accommodations for tourists merit improvement.

A voyage of eight hours next brought me over the 48 miles from Zanzibar to Dar es Salaam. The old station there was found unchanged and was readily reoccupied. It was remarkable to notice the contrast in less than 50 miles between the old Asiatic atmosphere of Zanzibar and the orderly North-European park-like settlement established by the Germans in Dar es Salaam. In the old Portuguese center Mozambique, the next port south, the old fortress of stones brought from Portugal is intact after hundreds of years, and the town itself shows little evidence of change in the last few centuries.

Coming from Dar es Salaam to Mozambique, I experienced some difficulty in obtaining permission to land, this permission being obtained only after producing letters which fortunately had been obtained earlier from the Observatorio Campos Rodrigues in Lourenco Marques. The survey in Mozambique was awkward due partly to change in the immediate surroundings of the stations, disturbances encountered, and weather. About a week's delay was the result of this, an unhappy circumstance in view of the hotel accommodations.

In embarking here for Beira, another novel procedure was encountered. Not only did the ship stand well out in the channel, but under existing tide conditions the launch could not come near the pier. All of the luggage and equipment was therefore carried to the ship on the heads of a few natives. Hopping astride the neck of an undersized black, I then led the procession seaward, riding precariously over the waves for more than a hundred yards to join the launch.

At Beira, three stations were occupied, one of these being an exact reoccupation of a point previously used. The other two, better adapted for future use, were substantially marked through the courtesy of the government survey department. Beira was found to be particularly free from local magnetic differences.

Lourenço Marques was now again approached, this time from the north. Dr. Soares, Director of the Observatorio Campos Rodrigues, again received me very cordially and did all that was possible to facilitate the work. Observations were taken at six points in the Lourenço Marques-Pessene region. The observatory magnetic station, although no longer desirable for such work, was reoccupied for purposes of comparison with observations made there previously. Two stations were occupied in Pessene near the old station, now unsuitable, which were to serve as emergency repeat stations in the future. Swarms of locusts interfering with the visibility in Pessene sometimes made sighting difficult with telescope. Three new points were also occupied to provide good repeat stations for Lourenço Marques and to make it unnecessary to do further repeat work in Pessene, a place ill-suited for the purpose. Five of these stations were permanently marked through the courtesy of the government land survey department.

The inland stations from the Transvaal to Northern Rhodesia were next visited. Pretoria was the first of this group. On arrival in Pretoria, several weeks of delay were occasioned, first by the loss of the heavier baggage for a week, and later by necessary hospital work. Thereafter, four stations were occupied. Two of these were near the unsuitable old station and gave only an approximate connection with previous work because of uncertainties caused by the marked local disturbance in the region. Two new stations were selected in an undisturbed area for future use, and three of the four stations were permanently marked.

A stop was next made in Johannesburg. Here, at the request of the New Consolidated Goldfields, Ltd., a station was established at a point known to be geologically and otherwise undisturbed. This point was to serve the company as a base for geophysical prospecting work, as an added repeat-station, and as a point for checking results obtained in the Pretoria area not far north where large bodies of iron ore were located. This station was established at the company's expense.

Measurements were next made at Mafeking. The old station was still good, and a new station was established nearby for future security.

From Mafeking, famous during the Boer War, the rail journey was made across the desolate Bechuanaland Protectorate to Bulawayo, Southern Rhodesia. The old nonmagnetic hut used by Father Goetz at the Meteorological Observatory was cleared, and observations were taken there, including the diurnal variation series. In view of the probable shift of the Meteorological Observatory to another site, three new stations were occupied.

At Victoria Falls, the old station could not be used, and observations at points surrounding it were taken to relate the 1935 results to those of Grindley. Due to the local magnetic irregularities resulting from the underlying basalt rock, this reoccupation was not entirely satisfactory but it was as good as the circumstances would permit. A new station was also occupied and permanently marked. These points used were all so near the Falls that spray rising from the gorge occasionally fell as rain on the observing tent, while remarkable rainbow effects were frequently seen where the Sun shone on the cloud rising a thousand feet out of the Zambezi Gorge.

A few miles distant at Livingstone, Northern Rhodesia, observations were also taken. In traveling from Victoria Falls to Livingstone, the railroad crosses the Zambezi River just below the Falls, and an excellent view is obtained of one of the choice sights of the world. The old magnetic station was salvaged, and again a new station was occupied and permanently marked through the courtesy of the government survey department.

Salisbury was the last of the South African localities on the list and was reached by rail, the return being made through Bulawayo. It was necessary to seek in Salisbury the connection with past work which could not be gotten in Bulawayo because of recent changes in the structures adjoining the old nonmagnetic hut. At Salisbury, three stations were occupied, two being exact reoccupations of old points. One of the old stations was permanently marked, and a new point, the compass station at the air field, was marked through the courtesy of the town office and the aerodrome authorities before observations were made there. This additional point was used in view of the undesirable character of one of the old stations.

Having finished all the South and East African stations by the end of March, 1935, I made a voyage of 17 days from Beira up the coast to Aden, Arabia. At Aden, it was found that one of the stations had been rendered useless by town park and lighting construction. The other old station was difficult to approach but it was reoccupied satisfactorily, even though the lack of firm anchorage for the tent involved considerable risk of the instruments being knocked to the ground had the tent come loose in the stiff breeze. This station was on half-submerged salt flats not readily accessible from the land and reached from the bay only after a two-mile row and by wading with the instruments for about half a mile. I found the old station marker, frequently under water at high tide, somewhat displaced, but it could not be more permanently fixed under the circumstances. A new station was established and substantially marked near the Aden air field, and diurnal variation observations were taken at this new point in addition to the regular repeat observations.

Going from Aden to Port Sudan, I learned that the ship fares through the Red Sea were far out of proportion to those for similar distances elsewhere, and accordingly I took very uncomfortable accommodations for the two-day voyage to effect a substantial saving in the travel cost. At Port Sudan, the government officials offered every assistance and were particularly helpful in marking the old magnetic station. This station I found in good condition with the wooden peg left 17 years before still in place. This was the only point occupied here in view of its probable future availability. The observations made here were adequate but were somewhat less than I expected to take. I was cut short in my work by a young sandstorm which settled into a steady heavy wind.

The journey from Port Sudan to Suez was made on a small coast steamer heavily loaded with cattle on deck and with so many flies that it was useless to swish at them. Landing at Suez, I found that the magnetic instruments would not be allowed into Egypt without payment of a deposit in excess of funds in hand, unless special permission were obtained from the Finance Department in Cairo. It seemed that this permission could not be obtained within a week by correspondence, but that it might be quickly arranged by personal interview with the proper authorities in Cairo. On the day of my arrival in Suez, I hence proceeded in a private motor car to Cairo, the other passengers of this car being three Arabs and an Italian. The next morning, in Cairo, the instrument entry was arranged after visits to numerous officials. A day of leave was taken to see something of Cairo, and I also visited the magnetic observatory at Helwan where the Director was kind enough to take me for a thorough tour of the instrument houses. Returning then to Suez, I reoccupied the old station, and again it was necessary to establish a new station for future reference. In both Cairo and Suez, the government officials were very helpful and showed interest in the work.

After a somewhat roundabout voyage, during which several days were passed at Malta awaiting ship connections, I came next to Tripoli. Here I expected some difficulty, for I knew no Italian and expected to find few people with whom I could communicate. It was a very agreeable surprise for me to learn that a new American consulate had been opened only a few weeks previously. Through the good offices of the consul, I immediately was brought into contact with the Director of the Meteorological Service, who did more for me than I could possibly have asked. Two stations were expeditiously occupied, and I hastened on my way to Tunis. Again I passed through Malta, and after viewing the ruin that once was Carthage, I entered my first French port.

With assistance from the consular representatives and the Government Service Topographique, two stations were occupied which provided connections with past and future magnetic values, and I continued by rail to Algiers. At Algiers, it was learned that the magnetic observers of the Bouzareah Observatory were at the time in Paris, so that it was not possible to be of assistance in the matter of instrumental comparisons, but the regular observatory magnetic station was occupied, and the condition of the old field stations was investigated.

The observations at Algiers were concluded about the end of June, and with them the program of African field work was completed. It remained only to make intercomparison observations at Niemegk, Germany, and at Abinger, England, before returning to New York.

The passage from Algiers to Marseilles and the rail trip from Marseilles to Potsdam were uneventful, though interesting. In Potsdam, Dr. Nippoldt and Dr. Fanselau and their assistants co-operated in making the intercomparisons go speedily, and thereafter the staff of the Abinger Magnetic Observatory also did all that was required for the rapid and successful completion of the observational work.

Thus, at the beginning of August, I was able to appear again in Washington, having been nearly three years absent from the United States, and having been over 15 months en route since my departure from Huancayo. During these 15 months, and including also the final observations made at Cheltenham, I had occupied some 60 stations, and had traveled roughly 33,000 miles in so doing. Four observatory intercomparisons had been made, three diurnal-variation stations had been occupied, and a large number of new repeat-stations had been established and marked, in addition to the occupations of stations giving a connection with past measurements. Of the distance traveled, some 22,500 miles were covered by ship, 8,800 miles by rail, and the remaining 2,000 miles covered by auto.

A. G. McNISH, ON MAGNETIC WORK IN GUATEMALA, FEBRUARY TO APRIL, 1939

As part of the scientific program of the joint expedition of the Geophysical Laboratory and the Department of Terrestrial Magnetism of the Carnegie Institution, magnetic measurements were made at a limited number of repeat-stations in the region of the volcano Santa Maria, where the principal activities of the expedition were centered. Twelve magnetic stations were occupied in February and April as shown in Table 21.

Table 21

No.	Station	Date	Latitude		Longitude East	
		1939	°	′	°	′
1	Retalhulen, Guatemala	Feb 16, 17	14	32.4 N	268	16
2	Quezaltenango, A, Guatemala	Apr 2, 3	14	49.8 N	268	29
3	Huehuetenango, Guatemala	Apr 4	15	19.4 N	268	36
4	San Marcos, Guatemala	Apr 5	14	58 N	268	16
5	Champerico, Guatemala	Apr 7	14	19 N	268	04
6	Chichicastenango, Guatemala	Apr 9	14	56.6 N	268	54
7	Guatemala City, B, Guatemala	Apr 11	14	37.9 N	269	30
8	Guatemala City, C, Guatemala	Apr 11, 12	14	34.5 N	269	28
9	Coban, Guatemala	Apr 14	15	29 N	269	42
10	Salama, Guatemala	Apr 15	15	05.6 N	269	46
11	Zacapa, Guatemala	Apr 16	14	59.3 N	270	30
12	Puerto Barrios, Guatemala	Apr 17	15	45.3 N	271	24

The instrument used was CIW magnetometer inductor No. 27, with Kittel pocket chronometers Nos. 258 and 260, and Elgin pocket watches Nos. 108 and 111.

The first opportunity for occupying a magnetic station occurred in February when on February 16 and 17 a new station was established at Retalhulen, a town which served as the base of operation for the expedition during most of its stay in the field. After completing the program of work in the vicinity of the volcano Santa Maria, occupation of stations was undertaken from April 2 to 17 just prior to return of the expedition to the United States.

At Guatemala City, where observations were made April 11 and 12, the original station and station A of 1926 were found covered by houses, and station B of 1926 was too close to the built-up area to be entirely satisfactory for reoccupation. Accordingly, after occupying station B April 11, a new site was selected on the grounds of the Meteorological Institute, and a station, designated C, was occupied there April 11 and 12.

The last station occupied was at Puerto Barrios on April 17, and on the same day I left that port by steamer for Philadelphia, arriving April 23.

At all stations complete magnetic and astronomical observations were made, except that no latitude observations were obtained at San Marcos and Guatemala City.

J. T. MURRELL AND O. WENDENBURG, ON MAGNETIC WORK IN ARABIA AND IRAQ, MAY, 1937

A survey of the stations of Table 22 was made by the Gulf Research and Development Company using instruments loaned by the Department of Terrestrial Magnetism.

Table 22

No.	Station	Date	Latitude	Longitude East
		1937	° ′	° ′
1	Madaniyat, Kuwait, Arabia	May 8, 10	29 07 N	47 58
2	Bahra, Kuwait, Arabia	May 11, 13	29 37 N	47 57
3	Gahlula, Kuwait, Arabia	May 15, 16	29 19 N	47 23
4	Kuwait, Kuwait, Arabia	May 17	29 21 N	47 58
5	Basra, Iraq	May 22, 23	30 32.2 N	47 49
6	Bagdad, Iraq	May 25, 26	33 19.6 N	44 27

W. C. PARKINSON, ON MAGNETIC WORK IN AUSTRALASIA, ASIA, AND PACIFIC ISLANDS, FEBRUARY, 1936, TO AUGUST, 1938

On January 31, 1936, I turned over the charge of the Watheroo Magnetic Observatory to Mr. J. W. Green, whom I instructed respecting the affairs of the observatory. Intercomparisons of CIW magnetometers Nos. 18 and 28 with the observatory standards then proceeded. While awaiting the arrival of instrumental constants, a short field trip was made to the southwest of Western Australia. I left the observatory on February 6 and returned February 17. The CIW magnetic station at Bunbury B was reoccupied on February 10, and a new station, Albany B, was established on February 15 and 16. After return to the observatory, computation of field-observations and intercomparisons and general observatory maintenance work was continued until March 6, when I left the observatory en route for Sydney, traveling overland by utility truck. Between March 7 and 10, final preparations for this trip were made in Perth, and on the latter date, the journey from Perth to Merredin was made. The following day was spent in clearing the scrub for a view of the fixed marks and erecting the cairn on the summit of a granite hill, and on March 12 the magnetic station Merredin A was reoccupied. On March 13, I arrived at Coolgardie and closely reoccupied the station of 1914, on March 14.

Norseman was reached during the afternoon of March 15, and I left the following morning. Norseman is the last town encountered on the western portion of the overland trip, the next town being Penong in South Australia, some 800 miles distant. The journey from Norseman to Balladonia, 143 miles, a good portion being over very rough, stony roads, was made in about eight hours. On March 17 and 18 observations were made at Balladonia at a spot in very close proximity to the station of 1914. Leaving Balladonia in the morning of March 18 after making an azimuth observation, I hoped that Madura (205 miles) would be reached by nightfall, but the bad roads made this impossible. The difficult Madura Pass, with its large loose boulders and rocky steps, was successfully negotiated the following morning; and after a welcome bath in the hot mineral spring at Madura, a good run was made to Mundrabilla station. Here advantage was taken of the warm hospitality of Mr. and Mrs. Hogarth to have two-days' rest, while the automobile was overhauled and computation was done.

Eucla was reached on March 22 and on March 23 and 24 a station, Eucla, B, was established; the site of the magnetic station of 1914 was found to be covered to a height of about 12 feet by drift sand. On March 25, I left Eucla and camped that night at Nanwoora Sands. I hoped to reach Talawin Hut but two punctures, in fairly quick succession, necessitated a halt to repair the tubes. The following morning, March 26, a resumption of the journey was made and Ceduna was reached the same afternoon, a stop being made at Penong en route to obtain a South Australian driving permit. On March 27, observations were made at Ceduna, B; here again it was found impracticable to reoccupy the station of 1914, owing to the recent erection of iron structures nearby. On March 28, I continued to Kimba and thence on to Port Augusta, arriving during the afternoon of March 29. On March 30, the magnetic station of 1914 was recovered and observations were made.

Table 23

No.	Station	Date		Latitude		Longitude East	
			1936	°	′	°	′
1	Bunbury, B, Western Australia	Feb	10	33	20.6 S	115	38
2	Albany, B, Western Australia	Feb	15, 16	35	00.9 S	117	53
3	Merredin, A, Western Australia	Mar	12	31	28.6 S	118	17
4	Coolgardie, Western Australia	Mar	14	30	57.2 S	121	07
5	Balladonia, Western Australia	Mar	18, 19	32	28.4 S	123	53
6	Eucla, B, Western Australia	Mar	23, 24	31	43.2 S	128	53
7	Ceduna, B, South Australia	Mar	27	32	07.6 S	133	41
8	Port Augusta, South Australia	Mar	30	32	29.7 S	137	46
9	Portland, Victoria	Apr	9	38	20.6 S	141	37
10	Red Hill, New South Wales	May	4, Jun 2	33	44.5 S	151	04
11	Moruya, New South Wales	May	6, 7	35	55.1 S	150	06
12	Woolgoolga, New South Wales	Jun	4	30	07.2 S	153	12
13	Brisbane, B, Queensland	Jun	10, Jul 8	27	25.8 S	153	04
14	Toowoomba, Queensland	Jun	13	27	32.8 S	151	57
15	Roma, Queensland	Jun	16	26	34.0 S	148	48
16	Tambo, Queensland	Jun	19	24	53.3 S	146	16
17	Longreach, Queensland	Jun	26, 27	23	26.4 S	144	14
18	Clermont, B, Queensland	Jun	29	22	49.7 S	147	38
19	Rockhampton, Queensland	Jul	2, 3	23	20.0 S	150	30
20	Maryborough, Queensland	Jul	6	25	32.0 S	152	41
21	Moree, New South Wales	Jul	11	29	28.5 S	149	50
22	Werris Creek, New South Wales	Jul	13	31	21.6 S	150	39
23	Toolangi, Victoria	Aug	7-10	37	33.4 S	145	29
24	Sorell, B, Tasmania	Aug	20	42	47.0 S	147	33
25	Longford, Tasmania	Aug	24, 25	41	35.9 S	147	06
26	Wellington, New South Wales	Sep	4, 5	32	33.7 S	148	56
27	Townsville, Queensland	Sep	24	19	14.5 S	146	46
28	Makambo Island, Solomon Islands	Sep	28	9	04.9 S	160	10
29	Maringe Lagoon, Solomon Islands	Oct	3	8	05.0 S	159	31
30	Gizo Island, Solomon Islands	Oct	5	8	06.0 S	156	52
31	Faisi Island, Solomon Islands	Oct	6	7	04.5 S	155	53
32	Numa-Numa, Solomon Islands	Oct	7	5	50.1 S	155	13
33	Teopasino, Solomon Islands	Oct	8	5	39.2 S	155	07
34	Rabaul, Bismarck Archipelago	Oct	12	4	11.8 S	152	12
35	Salamaua, New Guinea	Oct	15	7	04.1 S	147	03
36	Madang, New Guinea	Oct	17	5	12.6 S	145	49
37	Lombrum, Bismarck Archipelago	Oct	18	2	02.4 S	147	23
38	Boram, New Guinea	Oct	20	3	43.3 S	143	41
39	Wiewak, New Guinea	Oct	20	3	33.7 S	143	38
40	Kavieng, Bismarck Archipelago	Oct	24	2	34.1 S	150	48
41	Pondo, Bismarck Archipelago	Oct	25	4	33.7 S	151	38
42	Samarai, New Guinea	Oct	29	10	37.4 S	150	40
43	Port Moresby, B, New Guinea	Oct	30	9	28.1 S	147	10
44	Amberley, New Zealand	Dec	24-26	43	10 S	172	43
45	Clinton, A, B, C, New Zealand	Dec	28-30	46	12.6 S	169	22
46	Kingston, New Zealand	Dec	30, 31	45	19.7 S	168	43
			1937				
47	Queenstown, New Zealand	Jan	1	45	02.4 S	168	41
48	Roxburgh, New Zealand	Jan	2, 3	45	33.7 S	169	20
49	Amberley, New Zealand	Jan	7	43	10 S	172	43
50	Eketahuna, New Zealand	Jan	9	40	38.8 S	175	43
51	Auckland (Hobsonville), New Zealand	Jan	18	36	47.4 S	174	40
52	Auckland (Domain), New Zealand	Jan	19	36	51.7 S	174	46
53	Te Awamutu, New Zealand	Jan	21	38	00.7 S	175	20
54	Rotorua, New Zealand	Jan	25	38	08.2 S	176	15
55	Opotiki, New Zealand	Jan	26, 27	37	59.8 S	177	17
56	Napier, New Zealand	Jan	29, 30	39	30.2 S	176	55
57	Blacktown, A, B, New South Wales	Feb	27-Mar 2	33	45.8 S	150	55
58	Nauru, Nauru	Mar	29	0	32.1 S	166	55
59	Ocean Island, Gilbert Islands	Apr	3	0	52.6 S	169	32
60	Nonuti Atoll, Gilbert Islands	Apr	7	0	47.8 S	174	28
61	Tapeteuea Island, Gilbert Islands	Apr	8	1	14.4 S	174	46
62	Arorai Island, Gilbert Islands	Apr	11, 12	2	38.5 S	176	46
63	Apiang Island, Gilbert Islands	Apr	16	1	48.8 N	173	02
64	Apia, Samoa Islands	Jun	11-25	13	48.4 S	188	14
65	Honolulu, Hawaiian Islands	Jul	9-16	21	19.2 N	201	56
66	Suva, Fiji Islands	Aug	3	18	07.5 S	178	26
67	Blacktown, A, B, New South Wales	Aug	27-29	33	45.8 S	150	55
68	Luganville, New Hebrides	Sep	10	15	31.1 S	167	10

Table 23--concluded

No.	Station	Date	Latitude	Longitude East
		1937	° ′	° ′
69	Port Patterson, New Hebrides	Sep 12	13 50.8 S	167 34
70	Port Vila (Fila), New Hebrides	Sep 16, 17	17 44.3 S	168 19
71	Papeete, A, B, Society Islands	Sep 30-Oct 1, 7	17 31.8 S	210 27
72	Tautira, A, B, Society Islands	Oct 4	17 44.3 S	210 52
73	Taravao, A, B, Society Islands	Oct 5, 6	17 44.0 S	210 42
74	Motu-Uta Island, Society Islands	Oct 12	17 32.3 S	210 26
75	Noumea, New Caledonia	Oct 30-Nov 1	22 16.6 S	166 27
76	Bourail, New Caledonia	Nov 3, 4	21 34.4 S	165 31
		1938		
77	Blacktown, A, B, New South Wales	Jan 18, 19	33 45.8 S	150 55
78	Watheroo, Western Australia	Feb 3- 5	30 18.9 S	115 53
79	Carnarvon, Western Australia	Feb 12	24 53.0 S	113 39
80	Port Hedland, Western Australia	Feb 15	20 18.9 S	118 36
81	Singapore, Malaya	Mar 4	1 18.4 N	103 52
82	Malacca, Malaya	Mar 7, 8	2 11.4 N	102 17
83	Kuala Lumpur, Malaya	Mar 11	3 08.8 N	101 44
84	Ipoh, Malaya	Mar 13	4 35.4 N	101 04
85	Penang, Malaya	Mar 16	5 25.0 N	100 19
86	Alor Star, Malaya	Mar 19	6 12.3 N	100 24
87	Tung Song, Thailand (Siam)	Mar 22, 23	8 10.1 N	99 41
88	Chumphon, Thailand (Siam)	Mar 25	10 30.7 N	99 11
89	Hua Hin, Thailand (Siam)	Mar 27	12 33.8 N	99 58
90	Bangkok, Thailand (Siam)	Mar 30, 31	13 44.6 N	100 31
91	Aranya Pradesa, Thailand (Siam)	Apr 1, 2	13 41.9 N	102 30
92	Siemreap (Angkor), Indo-China	Apr 4	13 21.9 N	103 52
93	Pnompenh, Indo-China	Apr 9	11 34.3 N	104 55
94	Hué, Indo-China	Apr 20	16 27.8 N	107 32
95	Hanoi, Indo-China	Apr 26	21 01.7 N	105 48
96	Vinh, Indo-China	Apr 29	18 40.3 N	105 40
97	Batavia, Malay Archipelago	Jun 11-28	6 11.0 S	106 50
98	Watheroo, Western Australia	Aug 8-10	30 18.9 S	115 53

The following day a comfortable trip was made from Port Augusta to Adelaide. The next morning I visited the Adelaide Observatory and discussed with Mr. Dodwell the matter of intercomparisons of the observatory instruments with magnetometer No. 28. After inspection of the station in West Park, it was decided to make the intercomparisons in National Park, Belair, about ten miles out of Adelaide, in the Mount Lofty ranges. The same afternoon, April 1, the equipment was taken out to the site and tents were erected. Observations, with interchange of stations, were made on April 2, 3, and 6, no observations being possible on April 4 and 5 owing to the ground being used for sports. The observations were sufficiently reduced and compared to ascertain whether any repetitions were necessary, and I left Adelaide during the afternoon of April 7, staying at Meningie overnight. The following day a long trip of 284 miles to Portland was made in just over nine hours, including a stop for lunch at Millicent and a call at the police station at Dartmoor for a Victorian automobile registration. The station of 1912 at Portland was exactly reoccupied the following day, April 9 and I left on April 10.

On May 4, magnetic observations were made at Red Hill on the site of the old branch observatory of the Sydney Observatory. None of the buildings remain, and only the bases of the piers of the magnetic hut are visible. The present station was therefore established in close proximity to these piers. The old observatory azimuth mark still stands, but azimuth observations could not be made owing to clouds and tall trees. Arrangements are being made to have the station permanently marked so that future reoccupations will require no azimuth observations. The Northern Survey have been using this site for the standardization of the vertical balances. The following day, May 5, I left Sydney for Moruya, making a close reoccupation of the station of 1912 there on May 6 and 7. Canberra was reached on the evening of May 7. The following day I visited the Mount Stromlo Solar Observatory and had conferences with Mr. Rimmer, Director, and Messrs. Hogg, Williams, and Higgs regarding their various lines of work.

On June 2, I left Sydney to undertake the reoccupation of magnetic stations in northern New South Wales and Central Queensland. Just after leaving Sydney I stopped at Red Hill and made an azimuth observation to complete the declination observations of May 4, 1936. The night of June 2 was spent at Taree. Woolgoolga was reached the following evening and, on June 4 complete observations were made at a station near the 1913 site. On June 5, the journey was continued to Murwillumbah, and a day was spent there. Brisbane was reached on June 7, and the site of the stations of 1913 and 1922 were visited but found to be on the eighteenth green of the municipal golf course, constructed some four years ago. Observations there being out of the question and the immediate vicinity being also unsuitable, the advice of Professor Parnell of the University of Queensland was sought as to a suitable site. Three were suggested and visited, final decision being made to observe on the Ascot racecourse. The permission of the Queensland Turf Club was readily given, and observations, except for azimuth, were made on June 10. The following day I left by the western road via Toowoomba. As I approached the mountain on which Toowoomba stands (the eastern boundary of the Great Queensland Tableland), rain began to fall and continued steadily all that day and until after noon on June 12. As it was imperative to allow the roads to dry up before I could proceed, it was decided to reoccupy the Toowoomba station and the peg was, after some searching, recovered. Observing was done on June 13, and the following day the western road was again taken. At this point, some appreciation of the primitive nature of the Queensland "roads" was gained, and this was more and more forcibly demonstrated as the journey progressed. It was confidently hoped to reach Roma during the late afternoon, but the truck arrived at Yeulba, after doing the last 30 miles in darkness over a very rough bush track very badly marked by signposts. On June 15, Roma was reached, and the afternoon was devoted to locating the station of 1913 and obtaining the necessary permission to work. A full program was completed at Roma on June 16. The experience of the Queensland roads thus far obtained showed that it would be necessary to shorten the day's running, and the journey to Tambo was done in two stages, the first, Roma to Morven, and the following day, Morven to Tambo. Between Roma and Morven, a wrong track was taken owing to the complete absence of signs and the diversity of tracks, all looking equally bad, this detour adding 35 miles and one puncture to the day's run. An exact reoccupation of the station of 1913 and 1922 at Tambo was made on June 19. The same evening rain began to fall and continued at frequent intervals throughout the night, the following day, and until the evening of Sunday, June 21.

On June 25 the journey to Barcaldine and Longreach was completed without mishap, although a wrong track was taken which added 30 miles to the distance covered. On June 26 and 27, observations were made at Longreach on a site not far from the station of 1913. At Longreach exhaustive inquiries were made as to the possibilities of proceeding via Hughendon to Townsville and on to Mackay. Information obtained at the Royal Automobile Club in Brisbane was definitely against the chances of getting through, and it was decided to return from Longreach eastward through Barcaldine and Clermont to Rockhampton and thence southward to Brisbane. As events turned out it was a wise chance, for the following week two inches of rain fell in the area where I should have been. I left Longreach on the afternoon of June 27, and by some night driving Jericho was reached that night. The journey was continued to Clermont the following day and observations were made there on June 29. In 1918 Clermont was partially destroyed by flood, and the whole town was moved (some of the larger buildings bodily) about a mile southward to higher ground. It was therefore impossible to locate the stations of 1913 and 1922, and a new one was established in the vicinity. Observations were made at Rockhampton on July 2 and 3 on the exact site of the stations of 1913 and 1922, and at the Maryborough station of 1913 on July 6. Brisbane was reached in the afternoon of July 7, and the following day the clouds fortunately broke for sufficient time to make azimuth observations to complete the observations of June 10. The next day, July 9, good progress was made to Glen Innes and Moree, the latter point being reached in the afternoon of July 10. Observations were next made at a point not very far from the site of the Moree station of 1913 which was found to be unsuitable for reoccupation. On July 12 a good run was made to Werris Creek, where a search was made for the station the same afternoon. It was found that dwelling houses had been erected over the site, and observations were therefore made on open ground about one-third of a mile northwards. The results, however, appear to indicate some considerable station-difference. The trip from Werris Creek to Sydney (250 miles) was made the following day, July 13.

On August 3, I left Sydney by truck en route to Melbourne and Tasmania. Recent heavy rains throughout New South Wales had caused floods around Wagga, and it was necessary to have the truck towed through lakes at Tarcutta, the roads being covered to a depth of nearly three feet. On August 5, I visited the Melbourne Observatory to confer with Dr. Baldwin and Mr. Holmes concerning intercomparisons with the magnetic instruments at Toolangi. As it was undesirable to use the observatory instruments at any station outside the observing hut, it was decided to take a series of observations with CIW earth inductor magnetometer No. 28 on the observatory piers, comparing the results with scaled values from the Eschenhagen magnetograms, an instrument specially controlled for the occasion by extra scale-value and base-line observations. Accordingly, I left Melbourne for Toolangi the following morning, August 6, accompanied by Mr. Holmes, who was in charge of the magnetic work of the Melbourne Observatory. During the period of observation at Toolangi and for three or four weeks afterwards, I was unfortunately suffering from a severe attack of lumbago and observing on the low piers was a slow and painful process. However, the observations were completed by noon on August 10, and I returned to Melbourne on the same day. After some business at the observatory and in the city I left Melbourne on August 14 by the Wollongbar for Burnie, Tasmania. After a particularly rough crossing, I proceeded to Launceston, arriving there August 15. The following day I went out to Longford to locate the magnetic station of 1923, intending to reoccupy it on August 17. Incessant rain, however, caused me to change my plans, and I proceeded from Launceston to Hobart to reoccupy a station in the south of the island. On August 18, I went out to Government House, near Hobart, to get permission to reoccupy one of the 1913-1923 stations which did not appear to be affected by local disturbance. However, it turned out that the site of the station had been converted to a vegetable garden, and the reoccupation was abandoned. The following day I left Hobart for Sorell, and during the same afternoon I searched for the station of 1923; this was found to be unsuitable for reoccupation owing to the growth of dense scrub and the erection of buildings with iron roofs in the near vicinity. I therefore went on to the township of Sorell itself (about three miles eastward) and, with the permission of the Town Council, I established a station in the public park. Observations were made at Sorell on August 20, during a day of very strong wind and several heavy showers. After the completion of this work, I returned to the north of the island via the East Coast road and arrived at Longford on August 24. The latter part of this trip was marred by heavy rains, causing floods which were reckoned to be the worst for eight years; several detours had to be made to avoid bridges which were well under water. Observations were made at Longford on August 24 and 25, and on August 28 and 29 the return trip was made from Launceston to Melbourne on the Taroona. After a few hours in Melbourne, during which the observatory was visited, I returned to Sydney via the South Coast road, arriving on August 31.

Field work in Australia, Solomon Islands, Territory of New Guinea, and Papua, was done between September

19 and November 5, 1936. I left Sydney on the motor-vessel Malaita on September 19. After I called at Brisbane on September 21, Townsville was reached in the morning of September 24. During the six hours that the vessel was in port, observations were made very close to the site of the previous station. The next port of call was Makambo Island in the British Solomons. The station of 1915 at Makambo Island was found to be unsuitable owing to nearby buildings, but observations were made on September 28 at a site close at hand. From September 29 to October 8, the Malaita made calls at various points in the Solomon and Bougainville Groups, and observations were made at every possible opportunity, as follows: October 3, Maringe Lagoon; October 5, Gizo Island; October 6, Faisi Island; October 7, Numa Numa; and October 8, Teopasino. On October 9, the Malaita reached Rabaul and here I transferred to the motor-vessel Macdhui which left Rabaul on October 13. During my stay in Rabaul, I inspected the site of the magnetic station of 1915 and 1921, but it was found to have been built over. After I consulted with the Department of Lands and Surveys, a new station was established on the cricket ground and a full set of observations was made there on October 12. On October 15, the Macdhui arrived at Salamaua, the principal airport for the New Guinea goldfields, and observations were made on the aerodrome during the afternoon of the same day. On October 17, observations were made at Madang, and on the following afternoon declination observations were secured at Lombrum in the Admiralty Islands during a brief stay. On October 20, the Macdhui again touched on the main New Guinea coast, at Boram, and during a cloudy forenoon, observations of horizontal intensity and inclination were made. The sky cleared somewhat during the afternoon, and advantage was taken of a brief stay at Wiewak, only 13 miles from Boram, to secure declination observations. From Wiewak, the Macdhui set course for Alexishaven which is about seven miles from Madang, arriving at about noon on October 21; here the ship's launch took me to Madang where two more declination observations were made before the steamer again called there the same evening. Kavieng, New Ireland, was reached on October 24; here it was anticipated that a full double set of observations would be secured, but by noon a violent storm had developed and observations had to be discontinued. However, declination, horizontal intensity, and inclination determinations were completed. The next call was made at Pondo, New Britain, and here all three elements were observed during the morning of October 25. After a brief stop at Salamaua during the evening of October 27, the Macdhui arrived at Samarai at 8:00 A.M. on October 29. Here observations were made on the site of magnetic station A of 1915, and the steamer left Samarai about midday. At Port Moresby, where the Macdhui arrived at about 8:00 A.M. on October 30, I was met by officials of the Survey Department and motored out to the police parade ground where the magnetic station of 1915 was reoccupied and a full series of observations secured. The same evening the Macdhui sailed southward and after a brief call at Brisbane on November 3 arrived in Sydney on November 5. During this trip, observations were made at 17 points.

Comparing this trip with that which I made over the same general area in 1915, it is noticeable that in only three instances was it possible to make exact reoccupations. There are two reasons for this: First, the discovery of gold in commercial quantities in New Guinea has caused the shipping companies to alter their itineraries to suit the new conditions, and they do not call at the same ports as they did in 1915; and second, the advances in building at the various ports have in many cases rendered the old stations unsuitable.

At many of the ports the short duration of the steamer's call necessitated making the observations against time, in some cases curtailing the program, but except for two instances, all three elements were observed. All possible facilities for the work were afforded me by the captains and officers of the Malaita and Macdhui, and acknowledgment of their co-operation is hereby made. Thanks are also due to the Survey Departments at Rabaul (Territory of New Guinea) and Port Moresby (Papua) for their kind assistance.

To carry out a program of observations in New Zealand I left Sydney on the Makura on December 15, 1936, and arrived at Wellington, New Zealand, on December 19. After visiting Dr. Kidson and discussing magnetic matters in general, I visited Dr. Marsden and discussed the reoccupations of New Zealand magnetic stations. On December 22, I left Wellington for Christchurch, arriving there the following morning. I went at once to the observatory and discussed with Mr. Skey the program of magnetic work and made arrangements to go to Amberly and observe there during the Christmas holidays. On December 23, I went out to Amberley and observed there, returning to Christchurch on December 26. The following day I left Christchurch to reoccupy stations selected by Mr. Skey in the South Island. Mr. Beagley accompanied me, at the request of Dr. Marsden and Mr. Skey, in order to watch the method of observation and to familiarize himself with the locations of the stations. The New Zealand Department of Scientific Research has on order three field magnetometers of the type developed by la Cour and intend doing considerable field work in the future. Mr. Beagley and I arrived at Clinton on December 28, and observations were made December 28 to 30 at three stations in the close vicinity of the stations of 1916 and 1922. The two subsidiary stations which were established suggested some local disturbance. Kingston was reached on December 30, and during that afternoon and the following day observations were made there. The site of 1922 was found to be quite unsuitable for reoccupation, being overgrown by trees and thick scrub. On December 31, the steamer was taken from Kingston up Lake Wakatipu to Queenstown where the station of 1922 was reoccupied on January 1, 1937. We left next morning by bus for Roxburgh and observations were completed the following day, January 3. We left Roxburgh on January 4 for Dunedin, there connecting with the train which arrived in Christchurch the same evening. On January 7, Mr. Skey and I went out to Amberley and worked together, he watching the galvanometer and I operating the inductor on the west pier. These results showed some scatter, but the mean result agrees closely with that obtained in 1922. I left Christchurch on January 8 by plane and arrived in Eketahuna the same afternoon, where I was joined by Mr. Baird, Mr. Skey's chief assistant, who was taking Mr. Beagley's place on my trip. Observations were made at Eketahuna on January 9, rain falling most of the day. The rain continued all night, and the tent, which had been left up with the hope that it would dry out, had to be packed up on Sunday afternoon, January 10, in heavy rain. Leaving Eketahuna that afternoon, we went to Palmerston North by bus, from whence the night express took us to Auckland.

On January 18, Mr. Baird and I went out to Hobsonville, and I made observations at a suitable point at an aerodrome. The commanding officer was anxious to have a true meridian set up on the aerodrome, and I promised to supply him with provisional values of the true bearings of certain marks from the magnetic station and also of the declination. The following day, January 19, observations were made at the station of 1922 in the Auckland Domain; this station was found to be locally disturbed and will in future be replaced by the Hobsonville site. Auckland was left on January 20, and on the next day I made a full set of observations at a new station at Te Awamutu, the old station of 1916 and 1922 being unsuitable for further reoccupation. On January 22, the journey was made to Rotorua, and after an inspection of previous sites, it was decided to make observations at a very suitable location not far from that of 1916. The observations were made on January 25, and on the following day observations were obtained at Opatiki. An inspection of possible sites at Napier was next made, and after permission was obtained, observations were begun at McLean Park on January 29. Unfortunately, rain began shortly after noon and observation had to be discontinued. The following morning, although fine enough to permit an azimuth observation, the wind reached gale force and only one additional declination observation was secured. On January 30, I left Napier by road and arrived in Wellington the same evening. I left Wellington for Sydney on February 9, arriving there on February 12.

For the next series of observations in the Gilbert Islands I joined the freight ship of the British Phosphate Commissioners, the Triona, at Newcastle, New South Wales, which sailed on March 17, 1937. A good run was made northward, and Nauru was reached on March 26. I went ashore and called upon the Administrator, Commander R. Garsie, and, later, the local manager of the British Phosphate Commissioners, Mr. F. F. Christian. The following day, by invitation of Mr. Christian, I was accommodated in the visitors' quarters ashore and, on March 29, made a complete set of observations. On March 31, the Triona left for Ocean Island, arriving there the following morning; here Mr. G. J. Bridges, the local manager of the Commission invited me to stay at his residence. On April 2, I inspected the site of the magnetic station of 1915, and as this proved unsuitable for reoccupation, a new site was found; I also paid an official call on the Resident Commissioner, Mr. J. C. Barley. On April 3, I made a complete set of observations, and on April 5 I established a secondary station where declination observations were made. It should be noted that, owing to the close control of the chronometer correction during this trip by means of wireless time signals, the values of longitude obtained may be taken as fairly reliable and attention is directed to the divergence, in some cases, notably Ocean Island and Tapetenea Island, from the values officially adopted hitherto. During the afternoon of April 5, the Triona left Ocean Island for a trip around the Gilbert group; in all, seven islands of the group were visited; at two of these the time spent was only one or two hours. On the morning of April 7, Nonuti Island was reached, and I was landed by the ship's whale boat near the site of the station of 1915, where observations were made. We arrived at Tapetenea Island the following morning; here observations were made during the afternoon, and a return to the steamer was made, on the high tide, in the early hours of the following day, April 9. The stations of 1915 could not be even approximately reoccupied on this trip; however, in view of the structure of the atolls, it is not likely that the station differences would be considerable.

Late in the afternoon of April 9, the steamer called at Onatoa Island, but it was too late for observations to be made. A very brief stop was made at Tamana on April 10, and in the afternoon of April 11 I went ashore at Arorai Island and commenced observations, which were completed by noon the following day. On April 13, the steamer arrived at Beru Island, and I had intended to go ashore with the landing party and remain there until the following day, but I was unable to do so. After a brief stop off Tarawa Island to pick up mails on April 15, Apiang Island was reached late the same evening. Early the following morning, April 16, I went ashore, and observations were completed by noon and the Triona left for Ocean Island early the same afternoon, arriving there April 17. At the invitation of Mr. Bridges, I was again accommodated ashore and finally left for Newcastle during the afternoon of April 20, arriving there on April 30 from whence I proceeded the same day by train for Sydney.

No field observations were made in May, 1937, and in June a trip was made to the Apia Magnetic Observatory where intercomparisons of my field-instruments with the observatory instruments were made from June 11 to June 25. Intercomparison observations were next to be made at the Honolulu Observatory, and necessary steamer accommodations were promptly obtained for the trip to the Hawaiian Islands.

I arrived at Honolulu on July 7 and was met by Captain Peters, observer-in-charge of the Honolulu Magnetic Observatory. After some difficulties, my field equipment was cleared through the customs. The following day, July 8, CIW magnetometer inductor No. 13 arrived from Washington, and this instrument, as well as magnetometer inductor No. 28, was taken out to the observatory for intercomparison. Observations were begun on July 9. The stations occupied were: station A, the regular observing pier in the absolute observatory; and station B, a pier in a newly-erected nonmagnetic building, about 80 feet due north of station A and in line with station A and the observatory mark "North Meridian" the adopted azimuth of which is 180° S, 00'.0 W. July 9 and 10 were spent in inductor comparisons; during July 12, 13, and 14 declination and horizontal intensity observations were made. July 15 was devoted to preliminary computation of the results and on July 16 some repeat observations were made. The next several days were spent in computation, discussion of results, summarizing, and abstracting. On July 22, I went out to the observatory to pack magnetometer inductor No. 13 for shipment to Dr. Ting at Shanghai.

On July 26, I left Honolulu by the Monterey for Auckland, New Zealand, making observations en route at Suva, in the Fiji Islands, on August 3.

I left Sydney on the Pierre Loti on September 2, 1937, to occupy stations at various islands in the Pacific. We first called at Noumea, New Caledonia, on September 6, where an endeavor was made to locate the magnetic stations of 1915 and 1922, but without success. Leaving Noumea on September 7, the Pierre Loti proceeded to Port Vila, New Hebrides, calling at Mare, Loyalty Islands, for one and one-half hours on September 8; no opportunity was offered to get ashore at Mare. At Port

Vila, the general location of the magnetic station was found, and the Pierre Loti proceeded round the New Hebrides group the same day, September 9. During the morning of September 10 the steamer arrived at Luganville, and here the magnetic station of 1922 was located and very closely reoccupied. On September 12, Port Patterson, Banks Islands, was reached and observations of all three elements were made, but the series was not as complete as intended, owing to an incorrect report as to the early departure of the steamer. From Port Patterson, the Pierre Loti returned southward through the New Hebrides group and stopped at three points en route to Port Vila, but the stoppages were of brief duration and did not permit the making of observations. At Port Vila, on September 16, I left the Pierre Loti to await the arrival of the Ville d'Amiens which was to take me to Tahiti. During this time, after the necessary visits had been made to the British and French Residents for their permission to make observations, the stone slab left by Coleman in 1922 was found and a full set of observations was made there on September 17. On the following day the Ville d'Amiens arrived and I boarded her for Tahiti where we landed September 27. The two following days were used in paying official calls, making the necessary police registration, and visiting the meteorological observatory where I inspected their equipment and compared my chronometer with their standard clock. On September 30, I located the general location of the magnetic stations of 1916 and 1922 at Papeete but found that it was impossible to make an exact reoccupation owing to the area being used as an experimental seedling bed. I therefore observed at a site very close by on September 30 and October 1. On October 3 I left Papeete by car, intending to stop at Taravao to reoccupy the stations of 1916 in that locality, but I found on arrival that there was no accommodation there. I therefore proceeded 12 miles further on, to Tautira, finding accommodation in a chief's house. At Tautira, on October 4, observations were made at two stations. On October 5 the return journey was made to Taravao where accommodation had become available, and the site of the Fort Taravao magnetic station of 1916 was inspected but found unsuitable for reoccupation. Observations were therefore made at two new stations on October 5 and 6, about one-half mile to the west-southwest of Fort Taravao and close to the Vieno's farm station of 1916. On October 6 the return journey was made to Papeete. On October 7 I made observations at a subsidiary station near the Papeete station occupied the previous week. On October 8 and 9, I made a trip to the neighboring island of Moorea and on October 10 I endeavored to locate the magnetic station of 1916 and 1922 on Point Fareute but found the whole peninsula to be quite built over, a seaplane base and shipyard having been constructed there during recent years. I therefore decided to reoccupy the magnetic station of 1907 on Motu-Uta Island in Papeete Harbor, now used as a quarantine station. The magnetic station of 1907 and 1916 "small coral island" was found unsuitable as the island was awash and has been abandoned. Observations were made on Motu-Uta Island on October 12. It might be mentioned that Motu-Uta Island is used as a base station for longitude for the whole of French Oceania, and therefore the azimuth observation there on October 12 was used as a time correction. On October 14 I left Papeete on the Ville de Strasburg and arrived in Noumea on October 27. Here, after some delay, I secured an interview with the Governor of the Colony on October 30. In the meantime, I had again inspected the locality of the magnetic stations of 1915 and 1922, but I found even an approximate reoccupation impossible, owing first to changes in the terrain, and secondly, to the recent construction in the vicinity of an underground water-storage tank of reinforced concrete, with an iron roof and large iron water mains. I therefore searched for another suitable location, and during my interview with the Governor on October 30 asked his permission to make the observations in the rather extensive grounds of Government House. He kindly gave me this permission, and the same day (October 30) I began observations in Noumea. These were completed on November 1. Inquiries made in Noumea showed that the itinerary of the small coastal steamer running up the west coast of New Caledonia to Bourail and Pagoumene did not fit in with my period of stay in New Caledonia, so I decided to proceed as far as Bourail by road; the bus service at present only runs as far as Voh. On November 3 I went from Noumea by bus to Bourail. I was surprised to find that the mouth of the Bourail River, where the magnetic stations of 1915 and 1922 were established (the approach on these occasions being made by water), was over four miles from the town of Bourail, where the bus stopped. I made inquiries as to means of getting to the coast but found that there were no local means of communication. I therefore decided to establish a new station near the town of Bourail and a full set of observations was made there November 3 and 4. Fortunately, from the results of the observations, the general region of Bourail appears to be quite normal magnetically, and so a value of secular variation can be derived from the observations. I returned to Noumea the same evening, and left New Caledonia on the Pierre Loti on November 7, arriving in Sydney on November 11.

My next field trip involved work in Australia, Malaya, Siam, Indo-China, and the Dutch East Indies. I left Sydney, New South Wales, for Watheroo, Western Australia, on January 22, 1938, and arrived at the Watheroo Magnetic Observatory on February 2. The following day a series of intercomparisons between CIW earth inductor magnetometer No. 28 and the observatory standards was begun. These observations were completed on February 5, and after discussion of the results I left Watheroo for Perth on February 7. On February 10, I sailed from Fremantle on the motor-vessel Charon en route for Singapore. On the way up the Australian coast, declination observations were made at Carnarvon and full observations were made at Port Hedland. While the vessel called at Batavia, Java, I visited the magnetic and meteorological observatory and discussed with Dr. Beilage the matter of intercomparisons of instruments and magnetic work generally. It was decided to make comparisons between my equipment (No. 28) and the observatory magnetic standards on my return from southern Asia later in the year. I arrived at Singapore on February 28 and the following day endeavored to locate the previous CIW magnetic stations there; it was found that none of these stations could be reoccupied. I called on the Malayan District Surveyor and also the Director of the Malayan Meteorological Office and discussed the matter with them; it was decided to approach the officer-in-charge of the Singapore Airport for permission to make observations on the aerodrome. This permission was readily given and observations were made there on March 4.

During my stay in Singapore I made the necessary inquiries as to travel routes through Malaya, Siam, and

Indo-China and also obtained permission to make observations through Malaya. As a result of my inquiries, I decided to travel northward through Malaya to Bangkok, thence southeast to Saigon and along the coast of Indo-China northwards to Hanoi, the mode of return southward being left open to be based on more local information.

During the early afternoon of March 4, while making the observations at Singapore, when making preparation for a declination observation, a sudden gusty wind sprang up and loosened one of the fly-cords; while making this cord fast, another cord carried away, and the fly struck the instrument knocking it off the tripod stubs and against the center pole. The arresting knob took the force of the blow against the pole and split a portion of the wooden magnet housing. No other damage was done to the instrument, but as the weather conditions were growing rapidly worse observations were suspended in the hope that the station could be again occupied when I passed through Singapore on my way south. The split magnet housing was very neatly repaired in the instrument shop of the Survey Department at Kuala Lumpur a week later.

I left Singapore on Sunday morning, March 6, and arrived at Malacca (changing trains at Tampin Junction) the same afternoon. Here, after securing the co-operation of the District Surveyor and the Municipal Engineer, I made observations on March 8. The following afternoon I left Malacca and in the evening arrived at Kuala Lumpur. While the repair to the instrument was being effected, I discussed magnetic work with the Surveyor-General, Mr. Bridges. He sent word to his field officers in the places I was to visit, and they all rendered me very valuable assistance. A full set of observations was made at Kuala Lumpur on March 11, and I left the following morning, arriving at Ipoh the same afternoon.

Soon after my arrival at Ipoh I called on the Municipal Engineer who gave me the necessary permission to work, and on the following day, Sunday, March 13, I established a station on the riverbank. Observations in the afternoon were slightly curtailed by squally rain and a thunderstorm. I left Ipoh at midday on March 14 and arrived at Penang the same evening. The following morning I saw the District Surveyor and arranged with him to make observations on government land now being used as a polo ground. The day following my observations (which were made on March 16) the District Surveyor had one of his men tie in my station with survey pegs and supplied me with a sketch giving their bearings; these formed an excellent check on my azimuth observations. On March 18, I left Penang and arrived at Alor Star the same afternoon. Permission had previously been obtained for me to stay at the government resthouse at the aerodrome, where observations were made on Saturday, March 19. The journey from Alor Star across the Siamese border was made on March 21, and I arrived at Tung Song in the evening of that day. A suitable site was found the following morning and latitude observations were made, the magnetic work being done the following day.

In the morning of March 24, I left Tung Song and arrived at Chumphon the same evening; here full observations were made in the grounds of the government rest house on March 25. Leaving Chumphon at 1:30 A.M. on March 26, Hua Hin, a seaside resort, was reached at 8:00 A.M. the same morning. Here I intended to work on March 28 but during the morning of March 27 I was informed that my railroad ticket, taken from Penang to Bangkok, would become invalid after March 28. I therefore hurriedly began observations and completed the full program on March 27 with the exception of one observation of inclination and one of azimuth. During the afternoon of March 28 I traveled from Hua Hin to Bangkok. The following day I visited the American legation, and the secretary obtained permission for me to make observations in the grounds of the Royal Siamese Sports Club where the magnetic station of 1912 was situated. Observations were made there on March 30, the observation of azimuth having to be deferred until the following morning owing to clouds.

Early on April 1, I left Bangkok by train for Aranya Pradesa on the Siamese-Indo-Chinese border, arriving there during the afternoon, and an observation of azimuth was made soon after arrival. The following morning an abbreviated set of magnetic observations was made, and in the afternoon I left by motorbus for Angkor and arrived at Siemreap (the town close to Angkor) the same night. The CIW magnetic station of 1912 at Angkor was situated in close proximity to the ruins of Angkor Vat, but this site was no longer available as a hotel had been built over it. I therefore made observations (on April 4) at Siemreap, six kilometers southward, permission of the Resident having been obtained the previous day. Pnompenh was reached in the evening of April 7, and the following day was spent in visiting the site of the CIW magnetic station of 1912, which was found unsuitable for reoccupation, and in getting permission of the Resident for observations to be made. A new magnetic station was established on the football ground and observations were made on April 9; early the following morning I left Pnompenh by motorbus for Saigon arriving there about midday. On April 11, I visited the United States consulate; Mr. Palmer, the vice-consul advised me that, owing to existing conditions, it would be wise to obtain formal permission from the French authorities before any observations were attempted in Saigon and other parts of Indo-China, and kindly offered to present my application. The application, both to the Governor of Cochin-China and the Governor-General of French Indo-China, was made the same day.

No reply to the vice-consul's letters and telegrams having been received by April 16, I left Saigon that evening for Hue en route to Hanoi, the vice-consul agreeing to advise me when the replies came to hand. Before leaving Saigon, I interviewed the manager of the government railroad, and when the nature of my work was explained to him, he gave me a special permit which extended the validity of the round-trip ticket Saigon-Hanoi-Saigon from 15 to 35 days, thus enabling me to break my journey wherever desirable for the purposes of my observations. The train left Saigon at 9:00 P.M. on April 16 and was due to arrive at Hué the following night, but owing to a breakdown it was not until 5:00 A.M. on April 18 that the train reached Hué. I spent the remainder of that day in resting and locating the site of the CIW magnetic station of 1912. On April 19, I visited the Resident and also the Mayor of Hué, who accorded me permission to make observations on government land not far removed from the 1912 site, which was unsuitable for reoccupation owing to nearby new buildings. Observations were made on April 20, and the same evening I left by night train for Hanoi, arriving there about midday on April 21.

In the meantime the applications to the Governor General and also to the Governor of Cochin-China had been acted upon favorably, and I secured an interview with the Director General of aviation who advised me that the most suitable place for the observations would be the grounds of the racecourse at Bagatelle, a suburb of Hanoi. During the day of April 26, when the observations were made, the Sun came out only for a few minutes in the morning and about noon. I left Hanoi in the afternoon of April 27 and arrived at Vinh the same evening. The following day I endeavored to locate the magnetic station of 1912 but without success--the description was very vague--and also visited the Resident who readily accorded me permission to establish a magnetic station in the stadium, and I made a full set of observations there on April 29. At Hanoi I contracted a chill which developed at Vinh into a troublesome cough, and when I reached Tourane in the morning of May 1 I was forced to go to bed and remain there for the ensuing two weeks. By the morning of May 14, I was sufficiently recovered to travel by train direct to Saigon where I arrived the following morning, May 15. The Tourane doctor advised me to return to a cooler climate as soon as possible and that in the meantime no exertion was to be undertaken; thus I was reluctantly forced to omit observations in Tourane and also other points in Indo-China through Saigon. At Saigon I joined the Felix Roussel on May 17 and arrived in Singapore during the morning of May 19. Here I remained until the end of the month, during that time, however, making sailing arrangements to leave Singapore on the first steamer direct for Fremantle, the Charon on June 4. Before sailing, instructions were received from Washington regarding intercomparison work at Batavia Magnetic Observatory; I therefore cancelled the through booking to Fremantle and arranged for a stop-over of one month at Batavia. I left Singapore on June 4 arriving at Batavia on June 6. The intercomparisons were begun on June 9 and continued until June 28. After completion of the work at Batavia, I left by steamer on July 5, arriving at Fremantle on July 18. To complete my program, I proceeded to the Watheroo Magnetic Observatory where intercomparisons were again made between magnetometer No. 28 and the observatory instruments on August 8 to 10.

L. A. RICHARDSON, ON MAGNETIC WORK IN AUSTRALIA, APRIL, 1936, TO DECEMBER, 1944

Observations in Northern Territory, Queensland, Western Australia, and New South Wales, March, 1936, to March, 1943.--Under the Bureau of Mineral Resources, Geology, and Geophysics, Department of Supply and Shipping, the Aerial, Geological, and Geophysical Survey of Northern Australia began field-work in 1935. Recognizing that the extensive geophysical operation of this organization would provide a good opportunity for securing much needed magnetic data from reoccupations of stations in the more remote parts of Australia, Mr. J. M. Rayner, consultant geophysicist, made plans for the inclusion of the necessary activities in the program. Accordingly, following negotiations between the Department of Terrestrial Magnetism and Mr. Rayner, the writer was instructed to proceed to Watheroo Magnetic Observatory in March, 1936, for instruction in CIW technique used for land magnetic observations. A period of eight days was spent at Watheroo with Mr. J. W. Green, acting officer-in-charge, who provided excellent instruction covering the general requirements and the operation of CIW magnetometer and earth inductor No. 18.

A new station was established at Prospect near Sydney to replace the old Pennant Hills station which had become useless due to the construction of an electrified railway nearby.

The field season of the year 1936 was spent at Tennant Creek goldfield, Northern Territory, where magnetic surveys were conducted with variometers in search of auriferous ironstone deposits. En route to Tennant Creek, reoccupations were made of the CIW stations at Cloncurry, station A, and at Camooweal in Queensland. The Tennant Creek station was reoccupied during the year.

In February, 1937, contact was made in Sydney with Mr. W. C. Parkinson, then engaged on an extensive field program covering the Pacific Islands and parts of Australia, using CIW magnetometer and earth inductor No. 28. Mr. Parkinson had selected a new station for the Sydney district at Blacktown and on February 27, 28, and March 1, intercomparison observations were made at Blacktown stations A and B with Mr. Parkinson. This experience was welcomed by the writer and additional valuable instruction and advice were received.

The geophysical surveys at Tennant Creek were continued during 1937, and Cloncurry A was again reoccupied in April of that year while en route to Tennant Creek. During September and October of 1937, visits were made to Alice Springs and Daly Waters which enabled reoccupations to be made of the CIW stations at Taylor's Crossing, Barrow Creek, Ryan's Well, Alice Springs, Newcastle Waters, and Daly Waters, all in the Northern Territory.

Blacktown B was reoccupied in January, 1938, and was followed by reoccupations of CIW stations at Norseman, Western Australia, in June, and Croydon, Queensland, in December 1938. At some time following the observations at Norseman, possibly during transport by road to Wiluna, the magnet 18L suffered a decrease in moment from 300 to 285.

In 1939, after reoccupation of Blacktown B in April, normal field-work commenced with surveys on the Blair Athol coalfield in Queensland. The nearby CIW station at Clermont was reoccupied during July. The party was transferred to The Granites in Northern Territory in September. Traveling in advance of the main party, I made reoccupations of the CIW stations at Jericho, Winton, Cloncurry A, and Camooweal in Queensland, and Tennant Creek in Northern Territory. In addition, a new station was established at Rockhampton Downs, Northern Territory. At The Granites the geophysical operations included extensive magnetic-variometer surveys which gave interesting results related to the zone of gold mineralization, and use was made of these survey results to select a site free of local anomaly to serve as a new absolute station. This station was established in November, 1939.

On the return journey from The Granites to Alice Springs in December, 1939, four new stations were established, one being at Thomson's Rockhole, two at unnamed localities (The Granites Road stations Nos. 1 and 2), and one at the homestead of Conistan cattle station.

At the end of the 1939 field season almost three years had elapsed since the previous intercomparison with instrument No. 28 in 1937 and further consideration was given to Mr. W. C. Parkinson's earlier suggestion that instrument No. 18 be forwarded to Watheroo for

Table 24

No.	Station	Date	Latitude		Longitude East	
		1936	°	'	°	'
1	Cloncurry, A, Queensland	Apr 18	20	42.4 S	140	30
2	Camooweal, Queensland	Apr 23	19	55.1 S	138	07
3	Tennant's Creek, Northern Territory	Jul 15, 16	19	33.4 S	134	14
		1937				
4	Cloncurry, A, Queensland	Apr 9	20	42.4 S	140	30
5	Taylor's Crossing, Northern Territory	Sep 29	21	14.6 S	134	06
6	Barrow Creek, Northern Territory	Sep 29, 30	21	32.0 S	133	53
7	Ryan's Well, Northern Territory	Oct 1	22	43.4 S	133	21
8	Alice Springs, Northern Territory	Oct 2	23	40.8 S	133	54
9	Daly Waters, Northern Territory	Oct 15	16	19.8 S	133	25
10	Newcastle Waters, Northern Territory	Oct 16	17	23.0 S	133	26
		1938				
11	Norseman, Western Australia	Jun 13	32	12.5 S	121	46
12	Croydon, Queensland	Nov 30-Dec 2	18	13.1 S	142	15
		1939				
13	Blacktown, B, New South Wales	Apr 28, 29	33	45.8 S	150	55
14	Clermont, Queensland	Jul 13, 14	22	49.2 S	147	39
15	Jericho, Queensland	Sep 2, 3	23	35.7 S	146	06
16	Winton, Queensland	Sep 5	22	24.1 S	143	03
17	Cloncurry, A, Queensland	Sep 8	20	42.4 S	140	29
18	Camooweal, Queensland	Sep 11, 12	19	55.0 S	138	07
19	Rockhampton Downs, Northern Territory	Sep 14, 15	18	57.0 S	135	11
20	Tennant's Creek, Northern Territory	Sep 16, 18, 21	19	33.4 S	134	14
21	The Granites, Northern Territory	Nov 12, 13, 14	20	32.7 S	130	19
22	Thompson's Rockhole, Northern Territory	Dec 2, 3	20	37.5 S	131	00
23	Granites Road, No. 1, Northern Territory	Dec 3, 4	21	07.5 S	131	23
24	Granites Road, No. 2, Northern Territory	Dec 4, 5	21	39.4 S	131	43
25	Conistan Station, Northern Territory	Dec 5, 6	22	09.1 S	132	31
		1940				
26	Blacktown, B, New South Wales	Jan 4, 5	33	45.8 S	150	55
27	Blacktown, B, New South Wales	Apr 3, 4, 5	33	45.8 S	150	55
28	Redbank, Northern Territory	Jun 26, 29	17	11.0 S	137	45
29	Croydon, Queensland	Aug 1, 3	18	13.0 S	142	15
30	Tennant's Creek, Northern Territory	Oct 21	19	33.4 S	134	14
31	Lolworth Goldfield, Queensland	Dec 2, 8	20	06.5 S	145	19
		1941				
32	Blacktown, B, New South Wales	June 30	33	45.8 S	150	55
		1942				
33	Blacktown, B, New South Wales	Jan 24, 26	33	45.8 S	150	55
		1943				
34	Blacktown, B, New South Wales	Jan 26, 27	33	45.8 S	150	55
35	Blacktown, B, New South Wales	Apr 3	33	45.8 S	150	55
36	Collaroy, New South Wales	Apr 18, 19	33	43.8 S	151	17
37	Lillipilli, New South Wales	May 8, 9, 10	34	04.2 S	151	07
38	Bombi, New South Wales	May 20, 21	33	30.8 S	151	25
39	Port Stephens, New South Wales	Jun 5, 6	32	43.4 S	152	10
40	East Maitland, New South Wales	Jun 7, 8	32	45.6 S	151	34
41	Blacktown, B, New South Wales	Jun 10	33	45.8 S	150	55
		1944				
42	Woolgoolga, New South Wales	Jan 4	30	07.2 S	153	12
43	Brisbane, C, Queensland	Jan 26	27	30.6 S	153	08
44	Tenterfield, New South Wales	Jan 31	29	04.1 S	152	02
45	Goondiwindi, A, Queensland	Feb 2	28	33.0 S	150	18
46	Moree, New South Wales	Feb 3	29	28.5 S	149	50
47	Werris Creek, New South Wales	Feb 5	31	21.6 S	150	38
48	Wellington, New South Wales	Feb 7	32	33.7 S	148	56
49	Blacktown, B, New South Wales	Mar 4	33	45.8 S	150	55
50	Shark Island, New South Wales	Mar 8	33	51.6 S	151	16
51	Bradley Head, New South Wales	Mar 16, 17, 18	33	51.2 S	151	16
52	Bordertown, South Australia	Jun 24, 25	36	18.9 S	140	46
53	Adelaide, West Park, South Australia	Jun 28, 29	34	55.7 S	138	34
54	Belair, A, South Australia	Jun 30	35	00.3 S	138	38
55	Port Augusta, A, South Australia	Jul 6, 8	32	29.7 S	137	45
56	Port Augusta, C, South Australia	Jul 7	32	30.4 S	137	46
57	Port Lincoln, A, South Australia	Jul 10	34	42.6 S	135	52
58	Port Lincoln, B, South Australia	Jul 11	34	43.4 S	135	52
59	Ceduna, C, South Australia	Jul 14, 15	32	07.7 S	133	40
60	Ceduna, B, South Australia	Jul 16	32	08.0 S	133	41

Table 24--concluded

No.	Station	Date	Latitude	Longitude East
		1944	° ′	° ′
61	Yalata Head, South Australia	Jul 18, 19	31 55.8 S	132 22
62	Eucla, B, Western Australia	Jul 22, 23	31 43.0 S	128 54
63	Balladonia, Western Australia	Jul 26, 27	32 27.8 S	123 52
64	Norseman, Western Australia	Aug 4	32 12.5 S	121 46
65	Coolgardie, Western Australia	Aug 6, 7	30 56.6 S	121 09
66	Cottesloe, A, Western Australia	Aug 16	31 59.1 S	115 46
67	Fremantle, Western Australia	Aug 25	32 03.4 S	115 46
68	Carnarvon, Western Australia	Aug 28, 29	24 52.6 S	113 39
69	Port Hedland, Western Australia	Aug 31	20 18.8 S	118 34
70	Broome, Western Australia	Sep 4	17 58.3 S	122 13
71	Geraldton, B, Western Australia	Sep 20	28 47.1 S	114 38
72	Mount Yokine, Perth, Western Australia	Sep 27	31 53.3 S	115 51
73	Bunbury, B, Western Australia	Sep 29, 30	33 20.9 S	115 38
74	Augusta, Western Australia	Oct 2	34 19.7 S	115 10
75	Albany, B, Western Australia	Oct 4	35 00.9 S	117 53
76	Merredin, A, Western Australia	Oct 7	31 28.5 S	118 18
77	Merredin, C, Western Australia	Oct 8	31 28.6 S	118 16
78	Esperance, B, Western Australia	Oct 14, 15	33 51.9 S	121 53
79	Balladonia, B, Western Australia	Oct 17	32 27.9 S	123 53
80	Yunta, South Australia	Oct 24	32 35.0 S	139 34
81	Broken Hill, B, New South Wales	Oct 25, 26	31 55.8 S	141 30
82	Wilcannia, New South Wales	Oct 28	31 33.5 S	143 22
83	Mildura, New South Wales	Oct 30	34 11.5 S	142 10
84	Hay, New South Wales	Nov 1	34 30.4 S	144 51
85	Darwin, Northern Territory	Dec 16, 17	12 26.8 S	130 50

intercomparison with the observatory instrument, No. 7. Accordingly, following a reoccupation of Blacktown B in January, 1940, the instrument was dispatched to Watheroo and the intercomparison made by Mr. Parkinson. It was returned to Sydney immediately after completion of this work.

Blacktown B was again reoccupied in April, 1940, before the commencement of field operations at Redbank copperfield in the gulf country of the Northern Territory. In June, 1940, a new station was established at Redbank adjacent to the copper mines. This locality is in one of the most remote parts of Australia and has a permanent population of one white man and numerous aborigines. The white man's abode was a cave in which he had lived for about 20 years.

Subsequent movements made possible the reoccupation of the CIW stations at Croydon, Queensland, and Tennant Creek, Northern Territory, in August and October, respectively. Finally in December, 1940, a new station was established at Lolworth, a small goldfield near Charters Towers, Queensland.

The field-work of the Aerial, Geological, and Geophysical Survey of Northern Australia was terminated in 1940. During subsequent operations in Sydney and Canberra, the series of observations at Blacktown B was maintained by reoccupations in June, 1941, January, 1942, and January, 1943. The instrument constants for December, 1935, were used in all computations for observations made during this period.

The magnetic-variometer equipment, available at all times for geophysical prospecting, was frequently used to investigate the geomagnetic field in the vicinity of existing stations and was always used before establishing a new station so that the site would be free from local disturbance. Of the stations mentioned above, Cloncurry A is known to be located in an anomalous area (common in the district) and at Blacktown there is a little local disturbance of superficial origin.

While the field observations were carried out by the writer, the overall arrangements necessary for the execution of the work were made by Mr. J. M. Rayner, and the formulation of general plans was facilitated by the complete co-operation of Mr. P. B. Nye, executive officer of the Aerial, Geological, and Geophysical Survey of Northern Australia.

Observations on East Coast of New South Wales, April to June, 1943.--The observations were made during a program of investigation required by the Royal Australian Air Force at radar stations to the north and south of Sydney. Prior to the start of the investigation, an exact reoccupation was made on April 3 of the Blacktown B, CIW station of 1937, which was the North Australia Survey station of 1937, 1938, 1939, 1940, 1941, and 1942. Subsequently during the investigation, new stations were established at Collaroy, Lillipilli (near Cronulla), Bombi (near north head of Broken Bay), and Port Stephens. On the return journey to Canberra, a close reoccupation was made of the East Maitland CIW station of 1921 which was a close reoccupation of the CIW 1913 station. Blacktown B was again exactly occupied on June 10.

Observations in New South Wales and Queensland, January and February, 1944.--A visit to Brisbane was necessary for the purpose of making magnetic investigations required by the Royal Australian Navy. N. Symmons, undergraduate of the Melbourne University, was employed to assist in the operations. E. Utting, geologist from Western Australia, temporarily serving with the Bureau, joined the party for the journey to Brisbane to become acquainted with some of the geology of the Eastern States.

Departure from Canberra was made on December 30, 1943. The journey was made by road. Observations were commenced at Woolgoolga where, on January 4, an exact reoccupation was made of the CIW station of 1936 which was a proximate reoccupation of the CIW 1913 station. Brisbane was reached on January 7, and 17 days were spent on the investigations for the Royal Australian

Navy. On completion of the work consideration was given to the occupation of a station in Brisbane. It was found that the CIW station of Brisbane 1922 in Victoria Park could not be occupied due to the presence of army temporary buildings nearby. At the time, particulars of the Brisbane CIW station of 1936 were not on hand, and after obtaining information on the geology of the Brisbane district a site for a new station was selected on the Mount Petrie rifle range near Cleveland Road.

The party departed from Brisbane on January 29 and arrived at Tenterfield on January 30. Here a close reoccupation was made of the CIW 1922 station which was an exact reoccupation of the CIW station of 1913. At Goondiwindi, a close reoccupation was made of the CIW A station of 1922. The B station could not be accurately located. At Moree, an exact reoccupation was made of the CIW station of 1936 which was a proximate reoccupation of the CIW station of 1913. The CIW station of 1936 at Werris Creek was occupied exactly. This was a practical reoccupation of the CIW 1913 station, but the area was found to be strongly disturbed due to rock magnetism so that the station difference between the 1913 and 1936 stations is likely to be considerable. Some time was spent in the Werris Creek district in search of a magnetically uniform area for the establishment of a new magnetic station, but the search was not successful. At Wellington a close reoccupation was made of the CIW 1936 station. The return to Canberra was made on February 8.

The time occupied on this expedition was 41 days. Seven stations were occupied. The road mileage amounted to 2,100 miles. With the exception of Moree, where the 1936 peg was left untouched, each station was marked with a 3 by 3 by 18 inch hardwood peg.

Observations in Sydney District, New South Wales, March, 1944.--An investigation of magnetic conditions at Sydney Harbor was required by the Royal Australian Navy. Prior to the start of this investigation, an exact reoccupation was made on March 4 of the Blacktown B CIW station of 1937, which was the North Australia Survey station of 1937, 1938, 1939, 1940, 1941, and 1942, and the Mineral Resources Survey station of 1943. Two new stations were established on Sydney Harbor for the purpose of the investigation for the Navy. One was on Shark Island and the other was on Bradley's Head. At each of these stations, variometer readings showed that there were fluctuations up to about 25 gammas in Z and less in H due to the effects of tramway and railway power lines.

Observations in South Australia, Western Australia, and New South Wales, June to November, 1944.--A visit to Fremantle, Western Australia, was necessary for the purpose of making magnetic investigations in connection with operations of the Royal Australian Navy. It was decided that the visit should be made by road from Canberra so that a number of magnetic stations could be reoccupied to obtain secular variation data. In addition to reoccupying the stations en route, use was made of the opportunity to visit three stations on the northwest coast of Western Australia by plane and to visit Watheroo Magnetic Observatory to carry out intercomparisons with the observatory instruments.

Departure from Canberra was made on June 19, the writer being accompanied by N. G. Chamberlain, B. A., geophysicist of the Bureau. Mr. Chamberlain had previously spent some years at Watheroo Magnetic Observatory and was therefore conversant with the general requirements of the magnetic work. His employment on this program was mainly for the purpose of providing him with experience in field methods.

The trip was made in a utility truck fitted with a gas producer trailer unit. Equipment carried included CIW theodolite magnetometer and earth inductor No. 18, one vertical and one horizontal force variometer made by Watts and Company, London, and one pocket chronometer, Ditischiem No. 50098.

The first set of observations was made at Bordertown where a close reoccupation was made of the CIW station of 1911, 1914, 1916, and 1923, and the South Australia Magnetic Survey station of 1929. On arrival at Adelaide, the observatory was visited to meet Mr. Dodwell, government astronomer, and to obtain descriptions of those stations of the South Australia Magnetic Survey which it was proposed to occupy. Mr. Dodwell displayed much interest in the program and his co-operation and kindness contributed much to the success of the work and the enjoyment of the stay in Adelaide.

An exact reoccupation was made of the South Australia Magnetic Survey Adelaide West Park station of 1927, 1933, 1934, 1935, and 1937. As this site had become affected by fields arising from nearby tramway systems, the main magnetic station for the Adelaide district had been established at Belair National Park. An exact reoccupation was made of Belair A station, a South Australia Magnetic Survey station of 1934, 1935, and 1936, and a CIW station of 1936.

At Adelaide the party was joined by H. B. Owen, geologist of the Bureau, who had been instructed to carry out some geological investigations on the tertiary limestone beds of the Nullarbor Plain. Departure from Adelaide was made on July 4. At Port Augusta an exact reoccupation was made of the CIW station A of 1923 and 1936 which was a very close reoccupation of the CIW station of 1914. Because local authorities advised that a new school was soon to be built on or near the site of this station, a new station designated Port Augusta C was established to the east of the town near the gaol.

The pocket chronometer gave trouble while at Port Augusta, showing a tendency to stop for no apparent reason. Mr. Dodwell was communicated with and he very kindly arranged for the loan of chronometer Roskell No. 78 owned by the physics department of University of Adelaide, sending it by train to Port Augusta at once. The gas producer trailer was left at Port Augusta to insure reasonable progress for the long journey to Perth and return.

At Port Lincoln an exact reoccupation was made of the South Australia Magnetic Survey station of 1928 and 1939 which was a close reoccupation of the CIW station of 1911 and 1923. Since it was found that a new school was to be built on the site of this station, a new station designated Port Lincoln B was established on the nearby Centenary Oval. At Ceduna, the CIW station of 1936 was occupied exactly. The position of this station was considered to be unsatisfactory due to the presence of a new road passing very close to the station. A new station was therefore established nearby in the racecourse and recreation reserve.

The party left Ceduna on July 15. At Yalata Head station an exact reoccupation was made of the South Australia Magnetic Survey station of 1934 and 1939 which was a close reoccupation of the CIW station of 1911 and 1923. At Eucla an exact reoccupation was made of the CIW station of 1936 which was a proximate reoccupation of the CIW station of 1911 and 1914. At Balladonia a close reoccupation was made of the CIW station of 1914 and 1936. The site was considered unfavorable due to the rocky nature of the ground and the presence of local magnetic disturbance as revealed by variometer readings. This is produced by the granite which outcrops strongly nearby. Variometer work was carried out in search of a favorable site for a new station without success, and the matter was postponed until the site could be visited again on the return journey. Norseman was reached on July 29. The traveling conditions on the recently constructed Eyre Highway from Ceduna to Norseman were found to be very good.

Mr. Owen returned to Canberra from Norseman. His congenial company and assistance rendered in various ways whenever he had an opportunity were much appreciated. Furthermore, the association with him in his geological studies provided added interest to the journey and in some cases useful information aiding the selection of sites for new stations.

At Norseman a close reoccupation was made of the North Australia Survey station of 1938, which was a close reoccupation of the CIW station of 1912 and 1914. At Coolgardie an exact reoccupation was made of the CIW station of 1936, which was a close reoccupation of the CIW station of 1912 and 1914. While at Coolgardie, instructions were received to proceed immediately to Perth and complete the work for the Royal Australian Navy and to expect the early recall of Mr. Chamberlain to engage in important investigations in the Eastern States.

Perth was reached on August 10. The work for the Royal Australian Navy was completed by August 25, and during that time two stations were occupied. One was a close reoccupation of the Cottesloe A, CIW station of 1914, 1916, 1920, and 1921, and the other a new station established on the Royal Fremantle golf links. The Cottesloe station is still free from artificial disturbances but should the Perth-Fremantle railway line be electrified the site will be useless for normal purposes.

On August 27 the party left Perth by plane for stations on the northwest coast. At Carnarvon, a proximate reoccupation was made of the CIW station of 1914 and 1921. At Port Hedland an exact reoccupation was made of the CIW station of 1938 which was a proximate reoccupation of the CIW station of 1921. At Broome a close reoccupation was made of the CIW station of 1927 which was a close reoccupation of the CIW 1914 station.

The party returned to Perth on September 5 and, in accordance with prior arrangements made with Mr. W. C. Parkinson, observer-in-charge of the Watheroo Magnetic Observatory, we proceeded to Watheroo on September 7. Eleven days were spent at the observatory and during this time intercomparisons were made with the observatory instruments, attention was given to the re-blacking of the cross lines on the magnet 18L, moment of inertia determinations were made for magnet 18L, azimuth observations were made, and a variometer survey of the observatory area was carried out. The stay at the observatory was a very happy one owing to the kind hospitality of Mr. and Mrs. Parkinson, and was very instructive because of the expert advice given by Mr. Parkinson on various aspects of the work.

During the stay at Watheroo, Mr. Parkinson was told that Mr. Chamberlain might be recalled to Canberra before completion of the program, and the possibility of securing his son, Mr. W. D. Parkinson, from the observatory staff to replace Mr. Chamberlain was discussed. Mr. Parkinson was favorably disposed to this plan providing he could make arrangements for a Royal Australian Air Force man to join the staff of the observatory temporarily. The Head Office of the Bureau was advised of these discussions and on September 19 the party left Watheroo, arriving at Geraldton on the same day. The site of the CIW station of 1921 was approximately located, but since it was considered that the site was unsuitable, a new station designated Geraldton B was established on the Geraldton racecourse. Return to Perth was made on September 21 and, on September 22, instructions were received from the Head Office of the Bureau for Mr. Chamberlain to return to Canberra and for Mr. W. D. Parkinson to be engaged for the remainder of the program.

On September 26, in company with Mr. W. C. Parkinson who was visiting Perth, the Kings Park area was examined with a view to selecting a new station site. Variometer readings showed that the area was not suitable because of the disturbance arising from tramway power lines. At the suggestion of Mr. Parkinson, the Mount Yokine golf course was then examined and a suitable site for a station was found there. The station was occupied on September 27.

Mr. Chamberlain left Perth by train for Canberra on September 27. His period of participation in the program had been sufficient to show his complete understanding of the work and to permit him to become proficient in the field technique.

The writer left Perth by road on September 28 for the return journey to Canberra. At Bunbury on September 29, an exact reoccupation was made of the CIW station of 1921 and 1936. On September 30, W. D. Parkinson arrived from Watheroo, and the party proceeded to Cape Leeuwin on October 1. The site of the Cape Leeuwin CIW station of 1914 could not be determined exactly and the area was found to be disturbed due to rock magnetism and was in a very exposed position. A search was therefore made for a new site which was decided upon after much variometer work. The new station was located some miles from the Cape Leeuwin station and about one mile south of Augusta township. The widespread occurrence here of superficial laterite, giving rise to strong local magnetic anomalies made it difficult to locate areas exhibiting satisfactory magnetic uniformity. At Albany an exact reoccupation was made of the CIW station of 1936. At Merredin a very close reoccupation was made of the CIW station of 1936, which was an exact reoccupation of the CIW station of 1912 and 1916. Variometer work here confirmed the existence of strong local anomaly indicated by the work of earlier observers, and it was decided to establish a new station designated Merredin C in the recreation and sports ground. At Esperance, the site of the CIW station of 1914 could not be located; a new station, designated Esperance B, was established on October 14 and 15 on the cricket ground west of the town. At Balladonia further variometer readings were taken, and a station site was decided upon near the dam about one and one-half miles east of the old telegraph station. This station was named Balladonia B and the observations were made on October 17. Port Augusta was reached on October 22, the gas producer unit was collected, and the party proceeded to Yunta where an actual reoccupation was made of the South Australia Magnetic Survey station of 1930 which was an approximate reoccupation of the CIW station of 1911. At Broken Hill, the site of the CIW station of 1911 and 1923 could not be accurately located. Since the area was found to be disturbed by rock magnetism, a new station designated Broken Hill B was established on the racecourse. At Wilcannia a proximate reoccupation was made of the CIW station of 1913 and 1923, and at Mildura a proximate reoccupation of the CIW 1911 station was made on the sports ground alongside the recreation ground. At Hay, the CIW station of 1911 could not be reoccupied, and a proximate reoccupation was made in the school sports ground nearby. This was the last station on the program and the party returned to Canberra on November 2.

After spending a few days at Canberra, where an opportunity was provided for him to meet other workers interested in ionospheric studies, W. D. Parkinson returned to Watheroo by train and plane. The enthusiastic and competent manner in which his duties were carried out at all times was a notable feature of his service.

The time spent on the tour was 137 days of which 14 days were spent on work for the Royal Australian Navy and 33 magnetic stations were occupied. Road mileage amounted to 8,500 miles, and plane mileage to about 2,900 miles, making a total of some 11,400 miles.

All magnetic stations, except those of the South Australia Magnetic Survey at Eucla, Carnarvon, Port Hedland, and Broome, were marked with a concrete block 12 inches long, 4 inches diameter at top, 5 inches diameter at bottom, sunk flush with the surface of the ground in most cases. At each station, variometer observations were made at surrounding points to investigate the uniformity or otherwise of the vertical magnetic field.

Observations at Darwin, Northern Territory, December, 1944.--A visit to Darwin was necessary at this time to make investigations on behalf of the Royal Australian Air Force. Transportation was provided by Royal Australian Air Force transport plane from Melbourne. In addition to the above investigations, a proximate reoccupation was made on December 16 of the CIW station of 1923 which was a close reoccupation of the CIW Port Darwin station of 1912 and the Darwin station of 1914.

J. E. SANDERS, JR., ON MAGNETIC WORK IN AFRICA, JANUARY TO DECEMBER, 1927

Nigeria.--At the beginning of 1927, I was in Kano, Nigeria, one of the most interesting cities of West Africa. Within its ancient walls lived at that time a very much increased population, traders of all races from the equator to the Mediterranean being attracted by its great prosperity. This prosperity was evident in all British colonies of West Africa and was doubtless due in part to the stability of the British currency.

My instructions of April 20, 1925, called next for my making the trip of 500 miles to Fort Lamy. As it would have required at least 50 days by horse or camel, I endeavored to arrange for the trip by motor-car. I was unable to get any one to transport me the entire distance to Fort Lamy at a reasonable price, but through the good offices of the agent of the Niger Company, I finally managed to secure a car for the 350 miles to Maidugari.

Table 25 lists the stations occupied during 1927.

I left Kano by motor-car January 3, established a Class III station at Dambam near the eastern border of Kano Province on January 4, and arrived at Maidugari January 5. The good road traveled over materially shortened the time. After establishing a Class II station at Maidugari, I was able to secure passage with a Greek merchant who left Maidugari for Fort Lamy in a motor-lorry on January 9. On January 10, I reoccupied the CIW station of 1919 at Dikoa, but I was able only to make observations of a Class III station as my merchant would stop only a short time. We arrived at Fort Lamy January 11 at 8:00 P.M. The entire trip of 500 miles was made without any delay due to auto trouble, except for 50 miles through the Bornu forests; the whole trip was through semi-desert with flat sandy places here and there dotted with a clump of low scrubby bush. Antelope of the smaller species were in abundance, and wild guinea-fowl were very numerous. Often, without leaving my seat in the car, I was able to bring down an antelope or a pair of fowl.

I am under many obligations for numerous courtesies extended and great assistance rendered by officials in Nigeria, and I wish especially to express my appreciation of the kindness of Sir Graeme Thompson, Governor of Nigeria; of Captain Waters, Chief of the Nigerian Survey, and of representatives of the Niger Company in Eastern and Northern Nigeria.

French Equatorial Africa.--On January 15, I made the usual observations at Fort Lamy, C, the CIW station of 1919. From Fort Lamy I took advantage of the steamer service to cross Lake Tchad and reoccupy the CIW station of 1917 at Bol. I left Fort Lamy January 17 on the *Jacques d'Uzes* which has been in service on the Chari River since 1892. This proved to be a most interesting trip. The Lower Chari is teeming with wild life, and on every sand bar were seen many varieties of bird life intermingling with numerous crocodiles. Early in the mornings and late in the afternoons, antelopes were often seen on the riverbanks. The quiet of the night was frequently broken by the snorting of hippopotamuses feeding near the boat, or by the cries of other wild animals. One full day was required to cross the main body of the lake, "da Grande Eau," and another day was spent winding among the numerous islands of the northern half of the lake and among the floating islands of papyrus. At times, depending on the direction and force of the wind, the way to Bol is completely blocked by the papyrus. While occasionally this ancient plant is thus a hindrance to modern navigation, it has found its use among the natives. Since there is no timber in this region suitable for making canoes, the natives have taken advantage of the buoyancy of the papyrus to construct canoe-shaped rafts by binding together its stalks with grass ropes. Some of these rafts are capable of carrying ten cattle, along with several natives, across the lake. The natives are of the nomadic tribes and live almost entirely on meat and milk.

On January 19, I established a Class I station, called X, on the east bank of the Chari, about halfway between Fort Lamy and Bol. On January 21, 22, and 23 Bol was reoccupied as a Class II station, and the return trip was started January 24. I arrived at Fort Lamy January 29 and reoccupied station A January 31, February 1, and 3, completing the observations required for a Class I station.

There was no river steamer service on the Upper Chari after the middle of December. As it would have

Table 25

No.	Station	Date	Latitude	Longitude East
		1927	° ′	° ′
1	Dambam, Nigeria	Jan 4	11 40.7 N	10 40
2	Maidugari, A, Nigeria	Jan 6, 7	11 50.7 N	13 08
3	Maidugari, B, Nigeria	Jan 8	11 50.9 N	13 08
4	Dikoa, Nigeria	Jan 10	12 02.1 N	13 54
5	Fort Lamy, C, French Equatorial Africa	Jan 15	12 06.7 N	15 02
6	Bol, X, French Equatorial Africa	Jan 19	12 47.0 N	14 36
7	Bol, A, French Equatorial Africa	Jan 21, 22	13 27.6 N	14 43
8	Bol, B, French Equatorial Africa	Jan 23	13 27.5 N	14 43
9	Fort Lamy, A, French Equatorial Africa	Jan 31, Feb 1, 3	12 06.6 N	15 02
10	Miltou, French Equatorial Africa	Feb 15	10 13.7 N	17 27
11	Fort Archambault, A, French Equatorial Africa	Feb 16, 17	9 08.8 N	18 24
12	Fort Archambault, B, French Equatorial Africa	Feb 18	9 08.8 N	18 24
13	Kabo, French Equatorial Africa	Feb 19	7 42.1 N	18 39
14	Fort Crampel, A, French Equatorial Africa	Feb 21, 22	6 59.0 N	19 14
15	Fort Crampel, B, French Equatorial Africa	Feb 21	6 59.0 N	19 14
16	Fort Sibut, French Equatorial Africa	Feb 23	5 43.0 N	19 06
17	Bangui, A, French Equatorial Africa	Mar 1, 3, 5	4 21.8 N	18 35
18	Bangui, B, French Equatorial Africa	Mar 2	4 21.6 N	18 35
19	Leopoldville, A, Belgian Congo	Apr 9, 20	4 19.7 S	15 14
20	Matadi, A, Belgian Congo	Apr 27	5 48.6 S	13 28
21	Matadi, B, Belgian Congo	Apr 26, 28, 29, 30	5 49.6 S	13 28
22	Boma, A, Belgian Congo	May 2, 3	5 51.5 S	13 04
23	Boma, B, Belgian Congo	May 4	5 51.4 S	13 04
24	Mushie, Belgian Congo	May 15	3 01.5 S	16 54
25	Basongo, Belgian Congo	May 28	4 19.2 S	20 22
26	Port Francqui, A, Belgian Congo	May 31	4 19.8 S	20 34
27	Luebo, B, Belgian Congo	Jun 8	5 19.8 S	21 23
28	Luebo, A, Belgian Congo	Jun 9, 11, 13	5 19.8 S	21 23
29	Luebo, C, Belgian Congo	Jun 10	5 19.8 S	21 23
30	Bulape, Belgian Congo	Jun 16	4 37.4 S	21 30
31	Port Francqui, B, Belgian Congo	Jun 22	4 20.0 S	20 34
32	Port Francqui, A, Belgian Congo	Jun 23	4 19.8 S	20 34
33	Lusambo, A, Belgian Congo	Jul 18, 19, 22	4 58.3 S	23 26
34	Lusambo, B, Belgian Congo	Jul 20	4 58.6 S	23 26
35	Kwamouth, Belgian Congo	Aug 8	3 10.7 S	16 08
36	Bolobo, B, Belgian Congo	Aug 10, 11	2 09.6 S	16 09
37	Bolobo, D, Belgian Congo	Aug 12	2 09.5 S	16 09
38	Bolobo, E, Belgian Congo	Aug 13	2 09.6 S	16 09
39	Boma, B, Belgian Congo	Aug 23	5 51.4 S	13 04
40	Banana, Belgian Congo	Aug 26	6 00.6 S	12 24
41	Huambo, A, Angola	Sep 1	12 46.3 S	15 46
42	Huambo, B, Angola	Sep 2, 3	12 45.3 S	15 47
43	Chinguar, A, Angola	Sep 5	12 33.5 S	16 23
44	Chinguar, B, Angola	Sep 6, 7	12 33.4 S	16 23
45	Chissamba, A, Angola	Sep 9, 10	12 10.2 S	17 25
46	Chissamba, B, Angola	Sep 10	12 10.2 S	17 25
47	Cuanza Station, Angola	Sep 12, 13	12 00.4 S	17 45
48	Boma, A, Angola	Sep 19, 21, 22	11 48.8 S	20 09
49	Boma, B, Angola	Sep 20	11 48.8 S	20 09
50	Moxico, Angola	Sep 24	11 50.8 S	20 04
51	Kangonga, Angola	Sep 26	12 07.5 S	18 52
52	Cuanza, Angola	Sep 29	11 55.1 S	17 46
53	Lobito, B, Angola	Oct 8, 9	12 20.7 S	13 34
54	Loando, Angola	Oct 19, 20	8 48.8 S	13 14
55	Malange, A, Angola	Oct 24, 26, 28	9 32.8 S	16 21
56	Malange, B, Angola	Oct 25	9 32.8 S	16 21
57	Loando, João Capello Observatory, Angola	Oct 31, Nov 1, 2	8 48.8 S	13 13
58	Loando, Angola	Nov 3	8 48.8 S	13 14
59	Mossamedes, A, Angola	Nov 11	15 10.9 S	12 09
60	Mossamedes, B, Angola	Nov 10, 14, 15	15 10.9 S	12 09
61	Cape Town, A, Union of South Africa	Nov 29	33 56.2 S	18 29
62	Cape Town, C, Union of South Africa	Dec 1	33 56.2 S	18 29
63	Cape Town, E, Union of South Africa	Dec 8, 9, 10, 17, 19, 26	33 56.0 S	18 29
64	Cape Town, F, Union of South Africa	Dec 7, 8, 21, 22, 26	33 56.0 S	18 29

required more than two months to reach by barge the extreme northern limit of the motor service to Bangui during this, the dry season, I again resorted to the auto as a means of transportation. After the small Ford car I secured was loaded with my baggage, gasoline enough for the trip, the Greek chauffeur and myself, there was no room for my cook-interpreter, Idi Dosso, who had served me faithfully since May, 1926. I therefore gave him up with regret and arranged for his return to his home at Lagos via Kano. He had been especially useful on account of his ability to speak French, English, Arabic, and several native dialects. Our trip of 14 days, February 11 to 24, from Fort Lamy to Bangui was therefore made without a cook. As the Greek chauffeur made stews which he said could not be beat in Africa, we managed to get along. This time I did not escape without considerable auto trouble. A part of the route between Fort Lamy and Fort Archambault had not been worked over since the rains, the grass having been only burnt off. This left the road full of burnt stubble and until Fort Archambault was reached we averaged two punctures a day. Besides this, we suffered two breakdowns. Game was plentiful until reaching Fort Archambault, but very little was seen after that. However, the verdure increased greatly as we proceeded southward, and we reached the northern limit of the evergreen growth a few miles south of Kabo. Up to this point the soil had been very sandy, but here red laterite and outcropping rocks were encountered simultaneously with the evergreen forests. The landscape became more rolling and mountains could be seen in the distance. In the Oubangui-Chari-Tchad district the roads were excellent, and passable during the whole year. During the high-water season on the Chari, April to December, there was a regular motor service from Bangui to Fort Archambault, while during the dry months this service was from Bangui to Botangofo on the Wam River, about 150 miles southwest of Fort Archambault. I was unable to use this service, as it no longer passed through Fort Crampel and Fort Sibut, points which I was to reoccupy, according to my instructions. I arrived at Bangui the evening of February 24, having reoccupied four stations and established one new station in the 14 days of the trip. Class I observations were made at Bangui March 1 to 5.

I take advantage of this occasion to express my grateful appreciation of the many courtesies extended by officials, and particularly by His Excellency, M. Reste, Governor of French Equatorial Africa, by Captain Costle, officer-in-charge of Northern Cameroun, and by the various administrators of the Oubangui-Chari-Tchad district.

Belgian Congo.--I left Bangui March 15 on the first boat which I was able to get for the Lower Congo. This was by far the most uncomfortable voyage I had yet taken, covering a distance of nearly a thousand miles, down the Oubangui River to the point where it empties into the Congo, and thence down the Congo to Leopoldville. The trip was made in several stages on four different small French stern-wheelers, without cabin accommodations. There were 24 white passengers, 400 native soldiers of the French service, towed in barges, besides a heavy cargo of produce, so these steamers of small tonnage were very crowded. It was the dry season and much time was spent stranded on sand bars in midstream. One delay of 36 hours with the steamer perched on the pinnacle of a jagged rock will long be remembered by the passengers. Not until all the native soldiers and about 25 tons of cargo had been put ashore by means of the one small native canoe available could the steamer be freed from the rock, and then it was not her own power, but a terrific tornado that swept her clear of the rock and ashore on the bank opposite that on which were the native soldiers and the disembarked cargo. Fortunately the hull had not been pierced, and after refloating the vessel and replenishing our fuel supply from the forest along the riverbank, we reloaded our native soldiers and cargo and proceeded to our next sand bar. It usually requires 7 days to make the trip, and food had been provided for that time only, so for the last 7 of the 15 days required for the voyage, our diet consisted principally of tropical fruits found along the river, with an occasional tin of corned beef, known among the French as "du singe," and obtainable at the scattered trading posts of the river.

We arrived at Brazzaville March 29 in the afternoon, and as I was unable to find a room there, I crossed Stanley Pool the same afternoon to Kinshasa. Dry rooming quarters and good food were most welcome to me. Until April 22 I was here and at Leopoldville, spending part of the time recuperating from the effects of the difficult trip down the Oubangui and Congo, part in observing at Leopoldville, and part in preparing to carry out my expedition into Belgian Congo. My first mail since the preceding December reached me at Leopoldville on April 19.

As the season was not yet favorable for starting on the expedition to the upper reaches of the Kasai, I left Kinshasa by rail on April 22 to reoccupy the two stations Matadi and Boma on the Lower Congo. Observations were made at Matadi April 26 to 30 and at Boma May 2 to 4, and returning also by rail I reached Kinshasa again on May 7.

May 10 I left Leopoldville on the river steamer *Yser* for Basongo on the Kasai River. On May 15, I took advantage of a stop of a half day to establish a station at Mushie. We arrived at Basongo May 27, where I observed the next day. On May 29, I took a steamer for Port Francqui, observing at this place May 31. I embarked on the small steamer *Dixmude*, June 1, for Luebo. Although the distance is only 85 miles, we were until June 7 covering it. The progress was very much hindered by numerous sand bars, this being the dry season. The sand bars were not the only difficulties encountered. One day the boiler flues leaked so badly that we had to tie up for repairs. The place was far from any post and in a wild and heavily wooded country. In the cool of the afternoon, I took my guns and a couple native guides from the boat and went out in the hope of bagging some game. We plunged into the dense forest directly away from the river. The heavily wooded land with thick undergrowth made the going very slow and difficult. Although it was only the middle of the afternoon, the luxuriant foliage of the giant trees made such a complete canopy overhead that our light beneath was not much brighter than the dusk of temperate latitudes. In about half an hour, the trees became noticeably smaller and we struck the fresh trail of an elephant. The two guides and I had been conversing very freely, they in their native Baluba, and I in English or French, but except for signs and gestures neither side understood the other. We now moved forward very cautiously, and it was soon evident that we were approaching an open grassy plain. I sent the two guides up tall trees to look over the plain and report what they saw. One came back and said "canards." It was the first word of French either guide had spoken. I was quite suspicious of there being only "ducks" in the plain, and on reaching the border and finding the heavy-grass taller than my head, I decided to climb a tree and look over the plain myself. There 20 yards ahead, in the direction I had been going, was a lone elephant leisurely feeding on the young grass blades along a slough. I had been watching him for several minutes before he caught wind of me and suddenly became alert. He began to flap his ears and raised his huge trunk high in the air to ascertain the direction of the strange scent. In spite of my short distance from him, he did not see me, and I was able to descend to the ground and slowly back away without being discovered. Having no hunting license and only a small caliber rifle, it was doubtless just as well that I did discreetly withdraw and return to the boat.

We arrived at Luebo June 7, where I was very hospitably received by the American Presbyterian Congo Mission, and was given most comfortable quarters. This was the largest and most up to date mission that I had thus far seen on my trips into the interior of Africa. There were some 15 persons and the houses were of modern burnt brick. I left for Bulape on June 15 where I arrived on the afternoon of the same day. This was a very pleasant place to visit as I found here a cousin from Chattanooga, Tennessee, who was a member of the American Presbyterian Congo Mission. It was a great satisfaction to see some one from home after two and one-half years' travel in Africa. June 17 I went to Moeka which was then the head of the railroad from Port Francqui to Elisabethville, and returned by rail to Port Francqui the next day. It was July 1 before I was able to get a river steamer, the Princess Clementine, for Lusambo on the upper reaches of the Sankuru River. This trip was made much longer and more difficult by the fact that it was the dry season. In the afternoon of the second day out we struck a submerged snag. The captain thought no damage had been done, but at four o'clock the next morning when the native fireman started to build a fire under the boiler he found the firebox filled with water. An investigation showed that the hold had filled with water during the night and that the steamer was nearly in a sinking condition. To repair the holes in the hull, it was necessary to remove from the hold the water-soaked personal baggage of the 20 passengers, who stretched their clothes in the Sun to dry while the repairs were being made. There were 57 sacks of mail also submerged in the hold. We did not get under way again until the next morning. During the trip up the river, three native passengers were lost, either by drowning or by being carried off by wild animals from their camps along the riverbank at night. We reached Lusambo July 15 where I was very fortunate in getting most comfortable quarters with the Reverend J. J. Davis of the Southern Methodist Congo Mission. Lusambo, one of the larger of the interior European settlements, is the seat of administration of the Soukuru district, and also a depot for native produce en route from the interior to the coast. It is the upper terminus of the larger river steamers during the wet season.

July 26 I took passage again on the Princess Clementine for the return trip down the river, and I arrived at Port Francqui August 3 where I immediately boarded the larger steamer, the Sambre, to begin the trip to the Lower Congo and the coast. By then I had definitely given up as impracticable the plan to cross into Angola overland through the southern part of Belgian Congo. Communicating by telegraph with Matadi, I found that I still had time to reoccupy several stations I had missed on the trip up the Congo and Kasai, and to get to the coast in time for the first steamer for Angola. Accordingly, on August 7 I disembarked from the Sambre at Kwamouth where the Kasai empties into the Congo. After observing at this point, I boarded the small cargo steamer Brandt for Bolobo, about 80 miles up the Congo, where repeat observations were made. On August 16, I left Bolobo by steamer for Leopoldville and left the latter by train for Matadi on August 19. This train trip was slow and had some objectionable features, but it passed through a picturesque mountainous region. At Thysville, the halfway station, about 4,000 feet above the sea, one enjoys a cooler, less humid climate, and freedom from mosquitoes. August 21 I went by steamer to Boma, observing there, and on August 25 sailed on the coast steamship Wall for Angola. I took advantage of a stop of a half day on August 26 to observe at Banana. The same day the Wall steamed out of the mouth of the mighty Congo River, and I was not sorry to leave the equatorial climate behind. The Wall was not originally a seagoing craft, but had been built many years ago for service on the Congo. It had been reconditioned after lying at the bottom of the river for ten years, and at that time, August, 1927, was owned by the Belgian Government and operated between the mouth of the Congo and Angola on account of the irregularity of ocean steamer service in that area. We arrived at Lobeto, Angola, August 29.

I take great pleasure in expressing here my appreciation of the many courtesies shown me by officials in the Belgian Congo.

Angola.--I left Lobito August 31 on the Benguella-Elisabethville railroad. At that time this railroad was finished in Angola and was expected to be finished to Elisabethville in the Belgian Congo by 1930. Then Cape Town may be conveniently reached by rail from the Angolan coast. The completion of the railroad from Port Francqui to Elisabethville at the end of 1927 connected the steamer service of the Congo and Kasai Rivers with the rail service to Cape Town. By 1930 when Angola is also joined with Elisabethville by rail, these two combined systems will make travel in Central and South Africa much less difficult than I found it.

When I made this trip by rail from Lobito to the interior of Angola, Villa Luzo was the end of the train service and was also the point on the railroad nearest to the two 1920 stations of Boma and Moxico. Automobile service, which may be had at all times, was resorted to for these two stations. After occupying 12 stations on this trip, and spending several days on official business with administrative officials at Huambo and at Benguela, I finally returned to Lobito and observed there October 8 and 9.

October 11 I sailed from Lobito for Loando on the steamship Loando, arriving on October 14 and observing on October 19 and 20. I left Loando by rail October 22, observed at Malange October 24, 25, 26, and 28, and returned to Loando October 29. On November 4, I sailed from Loando on the steamship Africa for Mossamedes, where I arrived November 7 and observed from November 10 to 15. Mossamedes does not make a favorable impression on one approaching from the sea. Very little green is visible, and save for a few white buildings, the town blends in color with the monotony of the sand dunes behind it. Wood and water are expensive necessities, sold by the kilogram and liter. The principal occupation of the people is fishing. November 17 I sailed from Mossamedes for Cape Town, where I landed November 12.

I must take advantage of the opportunity to express here my appreciation of courtesies extended to me by officials in Angola. In this connection, I wish especially to express my indebtedness to the English personnel of the railroads, and in particular to Mr. T. H. Varian, resident engineer at Huambo.

Union of South Africa.--I was pleased to learn, from my mail at Cape Town, the first in a long time, that arrangements had been made with the University of Cape Town to carry forward the magnetic program in South Africa under the direction of Professor A. Ogg of the Physics Department of the University. Magnetometer inductor No. 13, sent for this work, arrived December 5, and by December 26 Mr. E. N. Grindley and I made complete intercomparison observations between the instrument he was to use, No. 13, and my instrument, No. 26.

December 31 I sailed from Cape Town on the German steamship Njassa, landing at Southampton January 25, 1928. On February 2, I left Southampton on the Republic of the United States Lines, and on February 14 I caught the first sight of my native land in exactly 33 months. I reported at the office in Washington February 16, 1928, having observed at 61 magnetic stations since January 1, 1927, during which time I had traveled 20,800 miles, as follows: 1,500 miles by automobile, 2,700 by railroad, 3,400 by river boat, and 13,200 miles by ocean steamer.

P. A. SIPLE, ON MAGNETIC WORK IN ANTARCTICA, NOVEMBER-DECEMBER, 1934

This party, consisting of A. F. Wade and myself, left Little America about the end of October, 1934, and followed the eastern trail to Mount Grace McKinley, arriving there on November 3. For three days we were beset by blizzards, and it was impossible to take solar observations because of fog and overcast sky. However, even though conditions were unchanged, we decided on November 6 to attempt magnetic observations. In order to mark our station permanently, we carried the instruments up the mountain slope to the exposure of granite rock on the southwest end of the mountain. The weather was thick with a strong north wind which increased to about 25 miles per hour shortly after we started observing, and we found it impossible to anchor our windbreak. Our choice of station was poor, for the steep cliff on the north side of the mountain broke the wind into eddies at the crest so that it was difficult to take the instrumental readings. However, we feel that sufficient care was taken to make the readings reliable. The results obtained with a compass dipcircle in approximately six hours were: two complete sets of declination (D), a complete set of inclination (I) with two needles, and a complete set of total intensity (F). The two of us alternately observed and recorded. We were forced to leave Mount Grace McKinley after two days of blizzard with no sign of clear weather. Solar observations were taken on the return journey.

Observations were begun at Donald Woodward Mountain on the afternoon of November 16 when a set of azimuth was obtained. A ski pole for an azimuth mark had been set up about five or six hundred feet away from the instrument, and a windbreak erected for shelter from an erratic gusty wind, but the wind increased to such an extent that both windbreak and ski pole were carried away, and the theodolite blew over, throwing the levels out of adjustment. Further observations were abandoned for the day.

The next day, with levels readjusted, we attempted another series of observations at our camp on the northwest side of the northwest peak of the mountain group which we took to be Donald Woodward, but which may have been William Haines Mountains. These rocks are probably pre-Cambrian sedimentary rocks, highly folded and metamorphosed, with mineral inclusions of iron, galena, and pyrites. The exposure is distinctly black.

For a new azimuth mark, a sharp peak was selected about 12 miles away, in a small group of rock exposures bearing almost southwest, and practically in line with our station on Mount Grace McKinley. This station was about 30 miles northeast of the station on Mount Grace McKinley. In spite of strong winds, a set of afternoon azimuth observations and a complete set of magnetic observations were obtained on November 17, with latitude determination on the day following. Wade and I alternately observed and recorded.

Table 26

No.	Station	Date	Latitude	Longitude East
		1934	° ′	° ′
1	Mount Grace McKinley	Nov 6, Dec 9	77 54.5 S	211 49
2	Donald Woodward Mountain	Nov 16, 17	77 28.6 S	213 14

On November 20, a single set of declination was obtained with the Gurley theodolite. Our station was located on Peak No. 33 northwest of Donald Woodward Mountain.

On November 24, a single set of declination was obtained with the Gurley theodolite on Peak No. 73 which is north-northeast of Peak No. 33 and east of Saunders Peak.

On November 27, a single set of declination was obtained with the Gurley theodolite on Peak No. 97A, which is north-northwest of Donald Woodward. This and the two preceding sets of declination observations were regarded as only approximate.

On the return journey to Little America, we stopped at Mount Grace McKinley on December 9 to make the solar observations which bad weather had previously prevented. Fortunately at this time the weather was favorable and the records for this station were completed.

From Mount Grace McKinley we proceeded directly to Little America.

F. M. SOULE, ON MAGNETIC WORK IN NORTH ATLANTIC AND ARCTIC REGIONS, JULY TO OCTOBER, 1931

In July, 1931, I was in Bergen, Norway, occupied with preparations for the Wilkins-Ellsworth Trans-Arctic Submarine Expedition of 1931. Before the arrival of the Nautilus in Bergen on August 1, I made magnetic observations at the observatory at Dombaas, in collaboration with Professor O. Krogness, for the comparison of instruments. On August 1, the Nautilus was joined by the scientific staff composed of Sverdrup, Villinger, and myself. Equipment and supplies were taken on board and the expedition departed from Bergen August 5. Stops were made at Tromso and Skjervo en route to Advent Bay, Spitsbergen. At Advent Bay, final supplies of fuel were taken aboard, and I occupied a magnetic station for observation of inclination and horizontal intensity. The expedition left for the ice on August 18. Because of the early loss of the horizontal rudder of the submarine, the expedition could not penetrate the ice-pack, but was forced to confine its operations to the ice-border.

The Nautilus returned to Advent Bay September 8, after being at sea exactly three weeks. During this period one magnetic station was occupied. At the time of the expedition's return to Advent Bay, plans were under consideration for the direct return of the Nautilus to American waters by way of Iceland and Newfoundland. In view of this, the scientific staff and the photographer were transferred to a coal steamer which sailed that night for Harstad, Norway. Because of lack of time, I was thus unable to reoccupy the magnetic station at Advent Bay. From Harstad, I returned to Bergen by mail steamer, arriving September 17.

Professor O. Krogness and I then reoccupied the magnetic stations at Hop, near Bergen, for instrument intercomparisons. Sailing from Bergen October 3, I arrived in New York October 13, and reported at the office in Washington October 14.

A. WALTER, ON MAGNETIC WORK IN AFRICA, OCTOBER, 1930, TO AUGUST, 1934

Early in September, 1930, earth inductor magnetometer No. 18 and appurtenances, and other observing equipment arrived in good condition at the office of the British East African Meteorological Service, at Nairobi, Kenya, Africa. It was not possible to commence observations in Nairobi during September owing to the strenuous work of organization of the Meteorological Service, but the instruments were taken on a long safari through Tanganyika, and plans were made, provided the weather was not too bad, to observe at several magnetic stations during October and November. Only part of the program could be completed, however, and observations were made only at Arusha, Tanganyika, in October, and at Abercorn, Northern Rhodesia, in November. Table 27 lists the stations occupied and their positions.

It was found desirable to construct an observing tent different from that supplied by the Department to enable observations to be made without interference of the center pole. Supports for the tent were made from brass tubing which was light and portable and easily dismounted. Observing was never done without a sun helmet and in the old tent it was difficult to get around the instrument.

It was hoped that a number of stations could be occupied in 1932 and 1933 during the International Polar Year program, but with the pressure of other work and lack of assistance, it was possible only to work in the month of February, 1933. Two stations were occupied at Kampala, Uganda, on February 16, 17, and 19 and one station was occupied at Nakura, Kenya, on February 24.

Table 27

No.	Station	Date		Latitude		Longitude East	
			1930	°	'	°	'
1	Arusha, Tanganyika	Oct	4	3	22.0 S	36	47
2	Abercorn, Northern Rhodesia	Nov	12-14	8	49.2 S	31	14
			1931				
3	Zanzibar, Zanzibar	Apr	21, 22	6	10.2 S	39	11
4	Chukwani Palace, Zanzibar	Apr	23, 26	6	15.0 S	39	13
5	Nairobi, B, Kenya	Jul	28-30	1	17.3 S	36	49
			1933				
6	Kampala, Uganda	Feb	16, 17	0	18.8 N	32	36
7	Kampala (Kololo Hill), Uganda	Feb	19	0	20.0 N	32	35
8	Nakuru, Kenya	Feb	24	0	17.1 S	36	04
			1934				
9	Nairobi, Kenya	Jun	6, 7, 15, 28	1	16.1 S	36	46
10	Tabora, B, C, Tanganyika	Aug	13, 15, 17, 23	5	01.2 S	32	50

The following year opportunity was taken in April to observe at two stations (one a repeat station and the other newly established) on the island of Zanzibar. In July of the same year observations were obtained at station B at Nairobi.

In 1934 opportunity was again taken to work at Nairobi, where observations were made on June 6, 7, 15, and 28. In August of the same year, stations B and C at Tabora, Tanganyika, were occupied August 13 to 23.

J. C. WOELFEL, ON MAGNETIC WORK IN NORTH AMERICA AND CENTRAL AMERICA, FEBRUARY TO JULY, 1934

Table 28

No.	Station	Date	Latitude	Longitude East
		1934	° ′	° ′
1	Puerto Armuelles, Panama	Feb 11, 12	8 16.1 N	277 08
2	Puntarenas, Costa Rica	Feb 27	9 58.7 N	275 10
3	San Jose, B, Costa Rica	Mar 6	9 57.6 N	275 54
4	San Jose, D, Costa Rica	Mar 7	9 57.0 N	275 52
5	Attu Island, Alaska	Jul 15	52 55.8 N	173 14

ADDITIONAL OBSERVATIONS AT FIELD STATIONS

A few additional observations were made at land stations by members of the scientific staff of the Carnegie, while on Cruise VII, between May, 1928, and November, 1929; by Ensign S. E. Latimer, U.S.N., in Cuba in March, 1927; by Lieutenant R. F. Stout, U.S.N., in Panama in May, 1928; by T. C. Poulter at Easter Island in November, 1933; and by other interested individuals with whom the Department of Terrestrial Magnetism co-operated.

REPORTS ON OBSERVATIONS AT FIXED STATIONS, 1927 TO 1944

Byrd Antarctic Expedition I

The instruments were provided by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. One of these instruments was used by Sverdrup and Amundsen on the Maud Arctic Expedition. Two magnetic huts were built at Little America, one for continuous photographic recording of the magnetic elements and the other for absolute observations made at intervals of approximately two weeks to fix the values on the photographic records. The latitude of the station was 78° 35′S and the longitude 196° 12′ E. Both houses were built of snow, one being lined with dark canvas over a timber frame to exclude light. This house was entirely buried in the snow for the sake of the heat insulation as it was not possible to use artificial heating of the hut. The temperature outdoors varied during the year over a range of 114° F while the corresponding range in the hut was 68° F. The minimum outdoor temperature was -72° F while the minimum in the hut was -37° F. The instruments used for the absolute observations were CIW magnetometer No. 8 and dip circle No. 242.

The observatory was operated from May, 1929, to February, 1930, over 240 daily records being obtained with magnetograph No. 5. The elements measured were declination, horizontal, and vertical intensity of the Earth's magnetic field.

Magnetic conditions were in general highly disturbed, e.g., the declination or direction of the compass needle varied frequently as much as three degrees during a single day, and on one day the compass needle oscillated through an arc of four and a half degrees. Quiet conditions were the exception, and these occurred mostly in winter and spring. Of 23 quiet days, 14 occurred in the winter months, 7 in the spring (September-October), and only 2 in the summer (November-February). (It is a point to note that the most disturbed magnetic conditions occur during the flying season.)

The angle of dip at Little America in 1929 was 82-1/3°. (At the magnetic pole it would be 90°.) The declination at Little America averaged 107° east of north, i.e., the direction of the south magnetic pole was 17° north of west. Thus the Little America magnetic observatory was south of the south magnetic pole and the nearest point to the south geographical pole at which continuous magnetic observations have been carried on.

The magnetic work was carried out by F. T. Davies, who was assisted by Arnold Clark and Larry Gould.

The expedition left Little America in late February and arrived at Christchurch, New Zealand, about the middle of March. Intercomparison observations were made between instruments used in Little America and those of the magnetic observatory at Amberley on March 17.

Byrd Antarctic Expedition II

The magnetic work on the second Byrd expedition was begun after the first of February, 1934, by E. H. Bramhall, who was assisted by A. A. Zuhn. Since it was desirable to obtain as near to a full year's records as possible, the establishment of a complete magnetic observatory proceeded with minimum delay.

The plans for the observatory called for the construction of two buildings made entirely of nonmagnetic materials. One was to contain variation instruments which would record continuously on sensitized paper all variations in the Earth's field, both in direction and intensity. The other was to contain a pier set firmly in the ice, on which the magnetometer could be used to determine periodically the absolute values of the magnetic elements, these data serving as control points for the variation instruments.

The variation building was completed February 12, 1934, and the instruments were installed on a large, especially designed pier, the base of which was buried several feel in the snow and cemented by the addition of water. The entire building was sunk in the snow to prevent large temperature-fluctuations, and was covered with a flat roof to prevent the accumulation of drift. A few days sufficed to make the final adjustments of the instruments, and these continued to operate with few interruptions until they were dismantled the following February.

About a hundred feet towards the camp the absolute building, a simple, box-like affair was located, and the two were connected by a tunnel. Then a straight passageway, 300 feet in length, with snow-blocks for a roof, was excavated in the face of difficulties caused by occasional blizzards, this passageway leading to the remains of one of the buildings left by the predecessors. In the wall at the end of this passageway was set a large timber to which was affixed a lamp, visible from the absolute building through a small window. The true direction of the line through the lamp and the center of the pier was determined astronomically. Thus, whatever the weather conditions outside, it was possible to ascertain at any time the magnetic declination simply by noting the difference between the direction of this line and that of the magnetic meridian, determined by measurement with the magnetometer.

Double walls and floor in the absolute building rendered it sufficiently well insulated so that a "Primus" stove with an arrangement of copper gasoline containers for radiators served to maintain a reasonably comfortable temperature in the coldest weather. In this respect, no difficulty in maintaining the regular schedule of observations was encountered.

The records at Little America, lacking only a fortnight of compassing a full year, gave a mean value of inclination, or dip, of about 82°, that is, 8° from the vertical. The horizontal intensity of the Earth's field was not far from 0.09 cgs unit, and the magnetic declination--the direction assumed by the compass needle--was about 107°.5 east of north. All of these values exhibited regular fluctuations of various periodicities as well as transient disturbances, or magnetic storms of considerable magnitude.

The magnetic station was in a location slightly different than that of the first expedition, being in latitude 78° 34′ S and longitude 196° 04′ E, as compared with 78° 35′ S and longitude 196° 12′ E. Continuous records of the magnetic elements were obtained from February, 1934, to February, 1935, with la Cour insensitive magnetograph CIW No. 7. Absolute observations for the control of the magnetograph were made approximately weekly with universal magnetograph CIW No. 21. Sixty sets of absolute observations were obtained, and these have been individually tabulated in the present volume.

Cheltenham Observatory

Through the courtesy of the Director of the U. S. Coast and Geodetic Survey, magnetic observations and instrument intercomparisons were made at the Cheltenham Magnetic Observatory from time to time during the years 1933 to 1941. Staff members of the Coast and Geodetic Survey who made observations which have been included among the data in this volume are A. K. Ludy and S. G. Townshend; members of the staff of the Department of Terrestrial Magnetism who made observations at Cheltenham were S. E. Forbush, J. W. Green, E. A. Johnson, H. F. Johnston, P. G. Ledig, R. H. Mansfield, A. G. McNish, W. E. Scott, S. L. Seaton, and W. F. Wallis

College Observatory

With the support and collaboration of the officers and faculty of the University of Alaska, magnetic observations were begun at College, Alaska, in July, 1941, using a continuously-recording la Cour magnetograph CIW No. 4 and CIW magnetometer inductor No. 25. The latter equipment was used approximately once each week for absolute observations of the magnetic elements, as control observations for the recording magnetograph.

For the period July, 1941, to April, 1943, E. H. Bramhall was in charge of the observatory program and from May, 1943, to December, 1944, S. L. Seaton was in charge.

The results of the absolute observations were summarized in monthly means for inclusion among the data tabulated in the present volume.

Huancayo Magnetic Observatory

Continuous observations of the magnetic elements were made at the Huancayo Magnetic Observatory of the Department of Terrestrial Magnetism from 1927 to 1944. Continuous records were obtained with Eschenhagen magnetograph CIW No. 2 and absolute observations, for control of the recorder, were made weekly with magnetometer CIW No. 10 and earth inductor CIW No. 5. Annual mean values of the magnetic elements were derived from the magnetograph records, for presentation in the present volume. In addition, various intercomparisons of instruments were made from time to time, giving results separately tabulated. With each annual mean value the observer-in-charge for the particular year has been designated in the last column of the table of data; for the other results, the individual observer has been designated in the customary manner. The staff members thus designated are J. E. I. Cairns, F. T. Davies, V. J. Eaton, S. E. Forbush, R. E. Gebhardt, P. G. Ledig, W. E. Scott, O. W. Torreson, and H. W. Wells.

Point Barrow

As part of the international network of magnetic stations maintained by various government and private agencies during the International Polar Year program of 1932-1933, a station was established at Point Barrow, Alaska, as a co-operative undertaking of the United States Weather Bureau of the Department of Agriculture, and the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

Suitable buildings were erected for installation of recording magnetograph No. 4 and for absolute observations with dip circle No. 242. Magnetograph records were obtained from October 1, 1932, to August 12, 1933. Absolute observations with the dip circle were made weekly and 42 sets of data were obtained from October 4, 1932, to August 7, 1933. The 42 sets of observations were arranged in monthly groups and monthly means taken for esentation in the tabulated data of this volume.

Standard Magnetic Observatory

The Standard Magnetic Observatory on the grounds of the Department of Terrestrial Magnetism in northwest Washington was used regularly until 1933, and intermittently thereafter, for magnetic work involving magnetometer intercomparisons and the determination of instrumental constants. In the meantime, however, gradual encroachment of the residential section of the city, and the increasingly heavy automobile and truck traffic on nearby parkways and roadways made the station less and less desirable for magnetic work. Accordingly, from 1933, the greater part of the magnetic work required to be done at or near Washington was transferred to Cheltenham Observatory, with the kind permission of the Director of the U. S. Coast and Geodetic Survey. Mention of the work there was made in an earlier paragraph. Observers who made the magnetic observations given in this volume for the Standard Magnetic Observatory at Washington were F. T. Davies, H. W. Fisk, S. E. Forbush, J. W. Green, H. F. Johnston, A. H. Kampe, and W. F. Wallis.

Watheroo Magnetic Observatory

Continuous observations of the magnetic elements were made at the Watheroo Magnetic Observatory of the Department of Terrestrial Magnetism from 1927 to 1944. Continuous records were obtained with Eschenhagen magnetograph CIW No. 1, and absolute observations, for the control of the recorders, were made weekly with magnetometer CIW No. 7 and earth inductor CIW No. 2. Annual mean values of the magnetic elements were derived from the magnetograph records, for presentation in this volume. A few sets of intercomparison observations gave additional results in the years 1935 to 1940, and these have been included in the present volume. For Watheroo, as for the Huancayo results, the name of the observer-in-charge for each year has been given with each annual mean of magnetic values; for the results of intercomparison observations the individual observer has been designated. The staff members thus indicated are W. Culmsee, J. W. Green, J. J. Hogan, H. F. Johnston, E. McCarthy, W. C. Parkinson, and F. W. Wood.

LAND MAGNETIC OBSERVATIONS

EXPLANATORY REMARKS

The results of this volume have been arranged and compiled in accordance with the conventions and practices adopted for previous volumes of this series.

In the tables, the results have been reduced to the magnetic standards of the Department. Corrections for post perturbation, daily variation, and magnetic disturbances have not been applied; methods of making these difficult and uncertain corrections have been discussed in a separate volume, and field results obtained since 1905 have been corrected and charted.[1]

In the first column of the table of land results appears the name of the station, which is usually the same as that of the town or village nearest the station. In the case of some stations in Antarctic regions, no names have been assigned, and the stations are designated by symbols furnished by the observers. When several stations were obtained only a few miles or less apart, they are distinguished by capital letters such as A, B, C, and so on, the alphabetical order usually corresponding to the order in which they were established as stations. Since the present volume is written in English, an attempt has been made to give a well-known Anglicized version of the name of any station, in harmony with the versions of previous volumes and conforming, where practicable, to local usage.

The next two columns give the geographical position in latitude and longitude, as derived in nearly every case from the observer's local astronomical observations made in accordance with the methods described in Volumes I to IV. When the latitude is the result of fairly complete circummeridian observations of the Sun, or the means of several reoccupations of the same station, or is derived from reliable large-scale maps, it is given to the nearest 0.′1, though it should be distinctly understood that this accuracy is not guaranteed, as even in these cases the error may be as much as 0.′5, and possibly in a few cases as great as a minute of arc. When the station latitude is given only to the nearest minute, either the observations were defective or the result has been taken from a standard atlas or map, and in some regions the error may be several minutes of arc. The longitudes furnished in the present volume are in many instances more accurately determined than in the past, due to increased use of radio time signals in obtaining corrections of chronometers in the field; the longitude is given to the nearest minute of arc, the value usually being based on astronomical observations. In many cases, however, the value has been obtained from a reliable map. The geographical position adopted in previous volumes is usually retained, except when there is good evidence that a revised value is more accurate.

In the adjacent columns are given the local date, and the times of observation to the nearest tenth of an hour. The letters "dv" appended in parentheses indicate that repeated observations of an element were made at short intervals over a period of time. An appended number in parentheses denotes the number of complete series from which the mean values given in subsequent columns are derived. Local times are reckoned from local midnight as zero hour.

The values of magnetic declination and inclination are given in degrees and minutes, and the horizontal intensity is given in c.g.s. units. The accuracy attained varies from station to station and naturally depends, among other factors, on the number of complete observations from which the mean values are derived and on the quality of the instruments used. The difficulty attendant on assessing the accuracy of observation at any individual station unfortunately has made it necessary in many cases to include figures which probably are not significant, a difficulty also encountered in previous volumes of this series. For instance, it is very probable that a few values of declination are in error by as much as two minutes of arc, and some values of inclination as much as three or four minutes (in the case of inclination the values are sometimes affected by uncertain corrections to standard values applicable in the field, even when earth inductors are used). In horizontal intensity, the last figure and not infrequently the two last figures may be in doubt in many instances. In any case, it should be noted that when use is to be made of the tabulated values, if the necessary corrections for fluctuating changes in the Earth's field are not made, a smaller number of figures than those given in the table of results should be used.

The instruments used are indicated by appropriate abbreviations and numbers in suitable columns; in the column headed earth inductor, the substitution of dip-circle measurements is indicated by the letters DC.

In the last column of the table of results, the observer responsible for the observation is designated, in the case of a single observer by his initials, and where two or more have co-operated, by the last initials of each. Table 30 lists the initials and names of the observers of the Department and co-operating institutions and organizations.

Distribution of Stations

An indication of the extent of the land work represented by the data in the Table of Results may be obtained from the summary given in Table 29 which shows the distribution of stations occupied during the 18 years from 1927 to 1944.

LITERATURE CITED

1. Vestine, E. H., and others. 1947. Description of the Earth's main magnetic field and its secular change, 1905-1945. Carnegie Institution of Washington Publication No. 578.

Table 29. Geographical distribution of magnetic observations, 1927-1944

Geographical divisions and subdivisions	Occupations			Localities		
	Primary	Auxiliary and Secondary	Total	New	Repeat	Total
AFRICA			199			121
Algeria	1	..		..	1	
Anglo-Egyptian Sudan	2	..		..	2	
Angola						
Belgian Congo	14	8		5	9	
Egypt	1	1		..	1	
French Equatorial Africa	9	5		2	7	
Kenya	11	2		7	4	
Nigeria	3	1		2	1	
Northern Rhodesia	2	2		1	1	
Portuguese East Africa	7	12		..	6	
Southern Rhodesia	6	9		..	5	
South-West Africa	12	6		2	10	
Tanganyika	3	2		1	2	
Tripolitania	1	1		..	1	
Tunisia	1	1		..	1	
Uganda	6	2		3	3	
Union of South Africa	31	18		6	26	
ASIA			117			88
Arabia	5	1		3	2	
Baluchistan	2	..	2	2	..	
China	41	29		12	31	
India	4	..	4	4	..	
Indo-China	5	..		..	5	
Iraq	3	2		3	2	
Japan	1	1		..	1	
Malaya	6	..		5	1	
Persia (Iran)	7	..	6	6	1	
Syria	4	1		5	0	
Thailand (Siam)	5	..		3	2	
AUSTRALASIA			161			103
Australia	136	9		21	70	
New Zealand	13	3		3	9	
EUROPE			15			10
Germany	3	2		3	..	
Great Britain	1	..		1	..	
Norway	4	5		5	1	
NORTH AMERICA			142			104
Alaska	7	..		3	2	
Canada	10	2		8	2	
Central America	23	5		5	18	
Greenland	20	15		26	5	
Labrador	4	3		3	3	
Newfoundland	1	1		..	1	
United States	35	16		25	3	
SOUTH AMERICA			166			89
Argentina	11	8		..	10	
Bolivia	4	2		1	3	
Brazil	23	18		4	20	
Chile	6	10		1	5	
Colombia	6	..		2	4	
Ecuador	2	2		..	2	
Guiana	4	2		..	4	
Peru	34	12		4	13	
Uruguay	1	1		..	1	
Venezuela	15	5		3	12	
ISLANDS, ATLANTIC OCEAN			24			16
Iceland	1	..		..	1	
West Indies	12	11		4	11	

Table 29. Geographical distribution of magnetic observations, 1927-1944--concluded

Geographical divisions and subdivisions	Occupations			Localities		
	Primary	Auxiliary and Secondary	Total	New	Repeat	Total
ISLANDS, INDIAN OCEAN . . .			2			1
Zanzibar	1	1		..	1	
ISLANDS, PACIFIC OCEAN . .			46			38
Bismarck Archipelago	3	1		3	1	
Easter Island	1	1		..	1	
Fiji Islands	1	..		..	1	
Galapagos	..	1		1	..	
Gilbert Islands	5	1		3	2	
Hawaiian Islands	1	1		..	1	
Malay Archipelago.	1	1		..	1	
Marianas	1	..		..	1	
Nauru	1	..		1	..	
New Caledonia	2	..		..	2	
New Guinea	4	2		4	2	
New Hebrides.	3	..		1	2	
Samoa Islands	1	1		..	1	
Society Islands	4	3		1	3	
Solomon Islands	5	1		3	3	
ANTARCTICA	19	4	23	22	1	23
Grand total			895			593

Table 30. Land magnetic observers, 1927-1944

Observer	Designation
E. H. Bramhall	EHB
F. C. Brown	FCB
E. C. Bullard	ECB
J. E. I. Cairns	JEIC
W. Culmsee	WC
O. Dahl	OD
F. T. Davies	FTD
A. L. Dawson	ALD
V. J. Eaton	VJE
H. W. Fisk	HWF
R. G. Fitzsimmons	RGF
S. E. Forbush	SEF
R. E. Gebhardt	REG
B. Gotsman	BG
F. R. Gracely	FRG
J. W. Green	JWG
E. N. Grindley	ENG
W. A. Grinsted	WAG
E. Hanson	EH
J. J. Hogan	JJH
E. A. Johnson	EAJ
H. F. Johnston	HFJ
A. H. Kampe	AHK
C. T. Kwei	CTK
P. G. Ledig	PGL
S. E. Latimer	SEL
A. K. Ludy	AKL
C. Malich	CM
R. H. Mansfield	RHM
A. E. Markey	AEM
E. McCarthy	EMcC
C. J. McGregor	CJM
A. G. McNish	AGM
W. C. Parkinson	WCP
T. C. Poulter	TCP
L. A. Richardson	LAR
J. E. Sanders	JES
W. E. Scott	WES
S. L. Seaton	SLS
F. M. Soule	FMS
R. F. Stout	RFS
O. W. Torreson	OWT
T. Viljoen	TV
W. F. Wallis	WFW
A. Walter	AW
H. W. Wells	HWW
J. C. Woelfel	JCW
F. W. Wood	FWW
A. A. Zuhn	AAZ
Bramhall, St. Amand	B-St
Bramhall, St. Amand, Wolff	B,St,W
Bramhall, Seaton	B-S
Bramhall, Seaton, Ohlsen	B,S,O
Bramhall, Seaton, St. Amand	B,S,St
Bramhall, Seaton, Wolff	B,S,W
Bramhall, Seaton, Wolff Ohlsen	B,S,W,O
Bramhall, Wolff	B-W
Bramhall, Wolff, Ohlsen	B,W,O
Bramhall, Zuhn	B-Z
Brown, Kwei	B-K
Davies, Torreson	D-T
Dawson, Markey	D-M
Eaton, Forbush	E-F
Fisk, Kampe	F-K
Fisk, Wallis	F-W
Forbush, Johnson	F-J
Green, Hanson	G-H
Green, Johnson	G-J
Green, Kampe	G-K
Grindley, Viljoen	G-V
Johnston, Forbush	J-F
Kampe, Wallis	K-W
Ledig, Forbush	L-F
Murrell, Wendenburg	M-W
Richardson, Chamberlain	R-C
Richardson, W. D. Parkinson	R-P
Scott, Seaton	S-S
Seaton, Wolff, Ohlsen	S,W,O
Siple, Wade	S-W
Townshend, Johnson	T-J
Wolff, Malich	W-M
Wolff, Ohlsen, Malich	W,O,M
Carnegie, Cruise VII	CVII

RESULTS OF LAND MAGNETIC OBSERVATIONS, 1927-1944

AFRICA

Algeria

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Algiers	36 48.1 N	3 02	Jun 25, '35	14.5, 16.4	8 19.0 W	13.3	52 18.7 N	15.2, 16.0	.25671	18	EI 18	RHM
			Jun 26, 35	10.7, 12.7	8 19.7 W	10.1, 13.2	52 19.6 N	11.2, 12.2	.25691	18	EI 18	RHM

Anglo-Egyptian Sudan

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Port Sudan	19 37.4 N	37 14	May 10, '35	9.6, 15.6	0 05.8 W	9.0, 16.1	22 53.9 N	14.2, 15.2	.34552	18	EI 18	RHM
			May 11, 35	....	....	13.9	22 54.7 N	....	....	...	EI 18	RHM
Gondokoro[b]	4 54.4 N	31 39	Jan 22, 34	....	....	12.9	12 25.1 S	....	....	...[a]	EI 18	ECB
			Jan 23, 34	11.4, 12.4	3 04.4 W	....	....	12.1	.33212	OS	....	ECB

Angola

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Loanda	8 48.8 S	13 14	Oct 19, '27	16.2, 17.6	13 37.0 W	14.8, 15.0	38 21.0 S	16.7, 17.2	.25300	26	EI 26	JES
			Oct 20, 27	8.6, 9.7	13 38.1 W	10.1, 10.3	38 18.8 S	8.9, 9.4	.25303	26	EI 26	JES
			Nov 3, 27	15.8, 16.0	13 36.8 W	....	....	....	....	26	....	JES
Loanda, João Capello Observatory	8 48.8 S	13 13	Oct 31, 27	16.5, 16.7	13 38.8 W	15.0, 15.2	38 25.4 S	....	....	26	EI 26	JES
			Nov 1, 27	14.5, 15.6	13 37.0 W	....	....	14.8, 15.3	.25266	26	....	JES
			Nov 2, 27	8.8, 9.8	13 40.3 W	10.2, 10.4	38 22.7 S	9.0, 9.5	.25280	26	EI 26	JES
Malange, A	9 32.8 S	16 21	Oct 24, 27	15.6, 16.8	12 57.5 W	13.6, 13.8	40 53.9 S	15.9, 16.4	.24696	26	EI 26	JES
			Oct 26, 27	7.2	13 00.7 W	....	....	....	....	26	....	JES
			Oct 26, 27	7.4 to 17.4 (dv)	12 58.9 W	....	....	7.4 to 17.4	.24726	26	....	JES
			Oct 28, 27	....	....	7.3 to 16.7 (dv)	40 53.7 S	....	....	...	EI 26	JES
Malange, B	9 32.8 S	16 21	Oct 25, 27	15.3, 16.4	12 57.7 W	13.3, 13.5	40 54.0 S	15.6, 16.1	.24701	26	EI 26	JES
Boma, A	11 48.8 S	20 09	Sep 19, 27	9.8, 11.1	12 38.2 W	14.5, 14.7	44 43.6 S	10.2, 10.8	.23839	26	EI 26	JES
			Sep 21, 27	6.2 to 17.1 (dv)	12 33.3 W	....	....	6.2 to 17.1	.23809	26	....	JES
			Sep 22, 27	....	....	6.4 to 17.3 (dv)	44 42.3 S	....	....	...	EI 26	JES
Boma, B	11 48.8 S	20 09	Sep 20, 27	9.7, 11.2	12 38.4 W	14.6, 14.9	44 42.6 S	10.0, 10.7	.23826	26	EI 26	JES
Moxico	11 50.8 S	20 04	Sep 24, 27	9.0, 10.4	12 37.9 W	10.9, 11.1	44 42.4 S	9.3, 9.9	.23839	26	EI 26	JES
Cuanza	11 55.1 S	17 46	Sep 29, 27	8.9, 10.0	13 52.7 W	10.4, 10.6	44 15.6 S	9.2, 9.7	.23712	26	EI 26	JES
Cuanza Station	12 00.4 S	17 45	Sep 12, 27	15.6, 15.8	13 14.2 W	....	....	....	....	26	....	JES
			Sep 13, 27	9.4, 11.3	13 18.4 W	16.7, 17.0	44 51.0 S	10.0, 11.0	.23486	26	EI 26	JES
Kangonga	12 07.5 S	18 52	Sep 26, 27	9.6, 10.8	13 00.6 W	11.1, 11.3	45 01.5 S	9.9, 10.4	.23494	26	EI 26	JES
Chissamba, A	12 10.2 S	17 25	Sep 9, 27	15.8, 17.1	13 55.8 W	14.3, 14.5	44 31.2 S	16.3, 16.8	.23392	26	EI 26	JES
			Sep 10, 27	9.2, 10.5	14 02.8 W	8.2, 8.4	44 34.3 S	9.5, 10.1	.23415	26	EI 26	JES
Chissamba, B	12 10.2 S	17 25	Sep 10, 27	15.7, 17.0	13 48.2 W	14.4, 14.6	44 40.4 S	16.1, 16.6	.23293	26	EI 26	JES

[a] British Ordnance Survey coil-magnetometer. [b] In Volumes I and II, this station is listed under Uganda.

AFRICA

Angola--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Lobito, B	12 20.7 S	13 34	Oct 8, '27	15.2, 16.5	15 12.8 W	14.0, 14.2	44 44.5 S	15.5, 16.2	.23017	26	EI 26	JES
			Oct 9, 27	9.0, 10.2	15 14.6 W	8.0, 8.2	44 41.7 S	9.4, 9.9	.23066	26	EI 26	JES
Chinguar, B	12 33.4 S	16 23	Sep 6, 27	15.0, 16.4	14 23.4 W	16.6, 16.8	44 57.8 S	15.3, 15.9	.23336	26	EI 26	JES
			Sep 7, 27	9.4, 10.8	14 24.0 W	11.3, 11.5	44 54.9 S	9.8, 10.5	.23361	26	EI 26	JES
Chinguar, A	12 33.5 S	16 23	Sep 5, 27	13.2, 14.4	14 46.5 W	14.7, 14.9	45 10.4 S	13.5, 14.1	.23288	26	EI 26	JES
Huambo, B	12 45.3 S	15 47	Sep 2, 27	15.5, 16.7	15 30.4 W	13.4, 13.7	45 27.8 S	15.8, 16.4	.23164	26	EI 26	JES
			Sep 3, 27	9.4, 10.6	15 34.0 W	8.4, 8.6	45 30.3 S	9.8, 10.3	.23222	26	EI 26	JES
Huambo, A	12 46.3 S	15 46	Sep 1, 27	15.6, 16.9	15 04.6 W	13.6, 13.8	45 28.1 S	16.0, 16.5	.23046	26	EI 26	JES
Mossamedes, A	15 10.9 S	12 09	Nov 11, 27	14.2, 15.5	17 19.8 W	11.1, 11.2	47 08.4 S	14.6, 15.1	.21756	26	EI 26	JES
Mossamedes, B	15 10.9 S	12 09	Nov 10, 27	14.6, 15.7	17 25.2 W	10.9, 11.1	47 04.4 S	14.9, 15.5	.21778	26	EI 26	JES
			Nov 14, 27	6.2 to 17.3 (dv)	17 29.4 W	....	....	6.2 to 17.3	.21761	26	....	JES
			Nov 15, 27	....	....	6.7 to 17.3 (dv)	47 09.1 S	....	....	...	EI 26	JES

Belgian Congo

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Bogoro	1 25.2 N	30 17	Jan 29, '34	11.1, 11.8	4 01.4 W	10.4	20 44.7 S	11.5	.31808	OS[a]	EI 18	ECB
Kissenyi	1 41.8 S	29 14	Feb 6, 34	16.5, 17.3	7 16.4 W	....	....	17.0	.29648	OS[a]	....	ECB
			Feb 7, 34	....	....	8.3	26 51.7 S	....	....	...	EI 18	ECB
Bolobo, D	2 09.5 S	16 09	Aug 12, 27	15.7, 17.0	9 36.9 W	14.6, 14.9	27 09.2 S	16.1, 16.7	.29044	26	EI 26	JES
Bolobo, B	2 09.6 S	16 09	Aug 10, 27	15.5, 16.8	9 44.6 W	14.3, 14.6	27 17.7 S	15.8, 16.4	.28986	26	EI 26	JES
			Aug 11, 27	9.7, 11.0	9 46.0 W	9.1, 9.3	27 21.0 S	10.1, 10.7	.29011	26	EI 26	JES
Bolobo, E	2 09.6 S	16 09	Aug 13, 27	9.8, 10.9	9 46.3 W	8.4, 8.6	27 16.8 S	10.0, 10.6	.29024	26	EI 26	JES
Mushie	3 01.5 S	16 54	May 15, 27	13.6, 14.9	9 52.2 W	15.9, 16.2	29 18.0 S	13.9, 14.6	.28471	26	EI 26	JES
Kwamouth	3 10.7 S	16 08	Aug 8, 27	15.8, 17.0	10 07.6 W	14.4, 14.6	29 29.5 S	16.2, 16.7	.28205	26	EI 26	JES
Basongo	4 19.2 S	20 22	May 28, 27	9.5, 10.9	8 41.4 W	11.2, 11.4	32 34.2 S	9.9, 10.6	.27860	26	EI 26	JES
Leopoldville, A	4 19.7 S	15 14	Apr 9, 27	9.2, 10.7	11 11.6 W	8.7, 8.9	31 24.0 S	9.7, 10.4	.27740	26	EI 26	JES
			Apr 20, 27	12.3, 13.7	11 07.2 W	9.9, 10.1	31 24.4 S	12.7, 13.4	.27704	26	EI 26	JES
Port Francqui, A	4 19.8 S	20 34	May 31, 27	14.0, 15.2	8 47.2 W	11.1, 11.3	32 03.7 S	14.4, 14.9	.27940	26	EI 26	JES
			Jun 23, 27	9.5, 10.8	8 49.0 W	14.5, 14.7	32 02.0 S	9.8, 10.4	.27972	26	EI 26	JES
Port Francqui, B	4 20.0 S	20 34	Jun 22, 27	14.1, 15.2	8 51.0 W	11.3, 11.5	32 05.1 S	14.4, 14.9	.27963	26	EI 26	JES
Bulape, Bakua N'Zeba	4 37.4 S	21 30	Jun 16, 27	8.6, 9.9	8 58.6 W	10.4, 10.6	32 44.0 S	9.1, 9.6	.27902	26	EI 26	JES
Lusambo, A	4 58.3 S	23 26	Jul 18, 27	15.6, 16.8	8 07.0 W	15.0, 15.2	33 29.4 S	15.9, 16.5	.27830	26	EI 26	JES
			Jul 19, 27	10.8, 11.8	8 19.2 W	10.2, 10.4	33 26.2 S	11.0, 11.5	.27856	26	EI 26	JES
			Jul 22, 27	9.1 to 17.1 (dv)	8 16.0 W	....	....	9.1 to 17.1	.27768	26	....	JES
Lusambo, B	4 58.6 S	23 26	Jul 20, 27	10.4, 11.5	8 20.7 W	9.8, 10.0	33 28.1 S	10.8, 11.2	.27869	26	EI 26	JES
Luebo, A	5 19.8 S	21 23	Jun 9, 27	15.3, 16.5	9 26.3 W	13.8, 14.0	34 09.5 S	15.6, 16.2	.27381	26	EI 26	JES
			Jun 11, 27	6.3, to 17.4 (dv)	9 24.5 W	....	....	6.3 to 17.4	.27413	26	....	JES
			Jun 13, 27	....	....	6.6 to 17.7 (dv)	34 10.3 S	....	....	...	EI 26	JES
Luebo, B	5 19.8 S	21 23	Jun 8, 27	15.2, 16.6	9 18.4 W	13.7, 14.0	34 04.3 S	15.6, 16.2	.27468	26	EI 26	JES
Luebo, C	5 19.8 S	21 23	Jun 10, 27	15.3, 16.5	9 28.2 W	14.4, 14.7	34 11.0 S	15.6, 16.2	.27378	26	EI 26	JES
Matadi, A	5 48.6 S	13 28	Apr 27, 27	9.9, 11.1	11 58.1 W	9.2, 9.4	33 49.4 S	10.3, 10.8	.26820	26	EI 26	JES

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[a] British Ordnance Survey coil-magnetometer.

AFRICA

Belgian Congo--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Matadi, B--concluded	5 49.6 S	13 28	Apr 26, '27	9.9, 11.2	12 25.0 W	9.2, 9.4	33 47.7 S	10.3, 10.9	.26640	26	EI 26	JES
			Apr 28, 27	15.2, 15.4	12 23.0 W	....	....	....	....	26	....	JES
			Apr 29, 27	....	....	9.1 to 17.3 (dv)	33 44.5 S	....	....	...	EI 26	JES
			Apr 30, 27	7.4 to 17.7 (dv)	12 23.1 W	....	....	7.4 to 17.7	.26641	26	....	JES
Boma, B	5 51.4 S	13 04	May 4, '27	13.1, 14.3	12 24.2 W	10.4, 10.6	33 35.8 S	13.5, 14.0	.26856	26	EI 26	JES
			Aug 23, 27	15.8, 16.9	12 21.2 W	15.2, 15.4	33 36.7 S	16.1, 16.6	.26792	26	EI 26	JES
Boma, A	5 51.5 S	13 04	May 2, 27	16.2, 17.4	12 18.8 W	14.3, 14.5	33 37.4 S	16.5, 17.1	.26848	26	EI 26	JES
			May 3, 27	10.4, 11.7	12 21.4 W	9.5, 9.7	33 34.4 S	10.8, 11.4	.26902	26	EI 26	JES
Banana, A	6 00.6 S	12 24	Aug 26, 27	9.2, 10.3	12 50.4 W	10.9, 11.1	34 01.9 S	9.6, 10.0	.26564	26	EI 26	JES

Egypt

Station	Latitude	Long. East of Gr.	Date	Decl. LMT	Decl. Value	Incl. LMT	Incl. Value	H.I. LMT	H.I. Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Suez	29 57.9 N	32 33	May 21, '35	11.0, 13.1	2 07.8 E	10.5, 14.0	41 59.3 N	11.6, 12.6	.30430	18	EI 18	RHM
			May 22, 35	8.5, 10.4	2 10.4 E	7.8, 10.9	42 01.4 N	9.0, 10.0	.30388	18	EI 18	RHM
			May 22, 35	14.1, 14.7	2 07.8 E	12.7	42 00.8 N	13.5, 14.4	.30402	18	EI 18	RHM
Suez, C	29 56.4 N	32 29	May 23, 35	14.4, 16.2	0 10.6 E	13.8	41 58.7 N	14.9, 15.7	.30388	18	EI 18	RHM
			May 24, 35	9.8, 11.4	0 12.7 E	9.0, 12.2	42 00.6 N	10.2, 11.0	.30369	18	EI 18	RHM

French Equatorial Africa

Station	Latitude	Long. East of Gr.	Date	Decl. LMT	Decl. Value	Incl. LMT	Incl. Value	H.I. LMT	H.I. Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Bol, A	13 27.6 N	14 43	Jan 21, '27	15.1, 16.3	6 18.8 W	14.2, 14.4	8 43.0 N	15.4, 16.0	.33330	26	EI 26	JES
			Jan 22, 27	8.1, 9.4	6 20.8 W	10.9, 11.1	8 46.4 N	8.5, 9.0	.33384	26	EI 26	JES
Bol, B	13 27.5 N	14 43	Jan 22, 27	....	....	16.8, 16.9	8 44.4 N	....	....	...	EI 26	JES
			Jan 23, 27	7.7, 9.0	6 18.8 W	....	....	8.1, 8.7	.33356	26	....	JES
Bol, X	12 47.0 N	14 36	Jan 19, 27	9.6, 10.6	6 27.8 W	9.2, 9.4	7 28.0 N	9.8, 10.3	.33346	26	EI 26	JES
Fort Lamy, C	12 06.7 N	15 02	Jan 15, 27	13.5, 14.8	6 26.8 W	11.2, 11.4	5 44.2 N	14.0, 14.5	.33330	26	EI 26	JES
Fort Lamy, A	12 06.6 N	15 02	Jan 31, 27	9.9, 11.1	6 21.5 W	11.5, 11.7	5 41.0 N	10.2, 10.8	.33412	26	EI 26	JES
			Feb 1, 27	....	....	6.8 to 17.7 (dv)	5 43.1 N	....	....	...	EI 26	JES
			Feb 3, 27	6.8 to 17.3 (dv)	6 23.8 W	....	....	6.8 to 17.3	.33393	26	....	JES
Miltou	10 13.7 N	17 27	Feb 15, 27	10.1, 11.4	5 55.8 W	7.9, 8.1	1 11.9 N	10.5, 11.0	.33354	26	EI 26	JES
Fort Archambault, A	9 08.8 N	18 24	Feb 16, 27	14.4, 15.5	6 00.5 W	17.1, 17.3	1 29.0 S	14.7, 15.2	.33376	26	EI 26	JES
			Feb 17, 27	7.9, 9.0	6 01.1 W	11.0, 11.2	1 27.8 S	8.2, 8.8	.33390	26	EI 26	JES
Fort Archambault, B	9 08.8 N	18 24	Feb 18, 27	9.0, 10.2	6 01.6 W	7.8, 8.0	1 27.8 S	9.4, 9.9	.33466	26	EI 26	JES
Kabo	7 42.1 N	18 39	Feb 19, 27	9.8, 11.0	5 43.8 W	11.3, 11.5	5 22.2 S	10.1, 10.6	.33056	26	EI 26	JES
Fort Crampel, A	6 59.0 N	19 14	Feb 21, 27	16.8, 17.8	5 51.2 W	14.7, 14.9	8 01.5 S	17.1, 17.6	.33030	26	EI 26	JES
			Feb 22, 27	6.9, 8.0	5 51.4 W	8.2, 8.4	8 02.1 S	7.2, 7.7	.33004	26	EI 26	JES
Fort Crampel, B	6 59.0 N	19 14	Feb 21, 27	6.8, 8.0	5 49.8 W	10.2, 10.4	8 02.4 S	7.2, 7.7	.32944	26	EI 26	JES
Fort Sibut	5 43.0 N	19 06	Feb 23, 27	9.8, 10.8	5 53.4 W	12.7, 12.9	10 39.8 S	10.1, 10.6	.32193	26	EI 26	JES

AFRICA

French Equatorial Africa--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Bangui, A	4 21.8 N	18 35	Mar 1, '27	12.7, 14.0	6 53.8 W	9.3, 9.5	12 58.4 S	13.1, 13.7	.31685	26	EI 26	JES
			Mar 3, 27	....	....	6.7 to 17.3 (dv)	13 00.0 S	....	....	...	EI 26	JES
			Mar 5, 27	6.9 to 17.7 (dv)	6 55.9 W	....	....	6.9 to 17.7	.31761	26	....	JES
Bangui, B	4 21.6 N	18 35	Mar 2, 27	16.7, 17.9	6 54.7 W	18.2, 18.3	13 02.3 S	17.0, 17.6	.31686	26	EI 26	JES

Kenya

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Nanyuki	0 02.0 N	37 05	Dec 13, '33	11.0, 11.7	2 29.6 W	10.4	23 19.3 S	11.5	.31616	OS[a]	EI 18	ECB
Equator	0 00.7 S	35 32	Dec 24, 33	14.0, 14.5	3 01.3 W	12.8	23 22.0 S	14.3	.31477	OS[a]	EI 18	ECB
Kisumu, B	0 05.0 S	34 45	Dec 27, 33	16.8	3 09.8 W	....	....	....	....	18	....	ECB
			Dec 28, 33	10.0	3 10.6 W	12.9	23 37.0 S	....	....	18	EI 18	ECB
			Feb 23, 34	15.0, 15.6	3 06.7 W	....	....	15.4	.31376	OS[a]	....	ECB
Kisumu, A	0 05.8 S	34 45	Dec 26, 33	16.1, 16.6	3 15.2 W	15.4, 15.6	23 57.8 S	16.4	.31335	OS[a]	EI 18	ECB
			Dec 27, 33	9.9, 11.0	3 16.0 W	....	....	....	....	OS[a]	....	ECB
			Dec 27, 33	10.7	3 14.2 W	....	....	....	....	18	....	ECB
Kampi-ya-Moto	0 07.1 S	35 56	Dec 10, 33	11.0, 11.6, 13.4	2 48.4 W	10.3	23 33.8 S	12.1, 13.2	.31379	OS[a]	EI 18	ECB
Nakuru	0 17.1 S	36 04	Feb 24, 33	12.1	2 49.4 W	....	....	15.1	.31141	18	....	AW
			Feb 25, 33	7.4	2 52.4 W	8.8	24 13.9 S	7.9	.31113	18	EI 18	AW
Gilgil	0 27.5 S	36 16	Dec 4, 33	11.1, 11.7	2 46.4 W	10.5	25 03.3 S	11.6	31157	OS[a]	EI 18	ECB
Fort Hall	0 43.0 S	37 10	Dec 18, 33	9.9, 11.4	2 45.3 W	11.0	24 55.9 S	10.2, 11.2	.31240	OS[a]	EI 18	ECB
Naivasha	0 46.5 S	36 26	Dec 2, 33	15.4, 16.5	2 36.6 W	11.1	24 56.8 S	16.3	.31090	OS[a]	EI 18	ECB
Kijabe	1 01.6 S	36 34	Nov 28, 33	15.6, 16.1	2 32.9 W	....	....	15.9	.30940	OS[a]	....	ECB
			Nov 29, 33	....	....	9.9	25 54.7 S	....	....	...	EI 18	ECB
Nairobi, west pier	1 16.1 S	36 46	Jun 6, 34	9.8	2 42.9 W	12.2	26 25.9 S	10.7	.30739	18	EI 18	WAG
			Jun 7, 34	10.1	2 49.0 W	11.4	26 22.9 S	10.5	.30782	18	EI 18	WAG
			Jun 15, 34	15.1	2 46.0 W	....	....	15.6	.30756	18	....	WAG
			Jun 28, 34	9.8	2 47.3 W	10.8	26 21.6 S	10.2	.30806	18	EI 18	WAG
Nairobi, east pier	1 16.1 S	36 46	Sep 17, 34	15.9, 17.5	2 46.0 W	....	....	16.4, 17.2	.30720	18	....	RHM
			Sep 18, 34	11.1, 12.7	2 44.8 W	10.5	26 24.7 S	11.5, 12.3	.30815	18	EI 18	RHM
			Sep 18, 34	15.6, 17.2	2 44.2 W	15.1	26 25.3 S	16.1, 16.8	.30760	18	EI 18	RHM
			Sep 21, 34	6.8 to 17.8 (dv)	2 45.3 W	....	....	17.2, 17.8	.30783	18	....	RHM
			Sep 22, 34	....	....	6.6 to 17.6 (dv)	26 26.2 S	....	....	...	EI 18	RHM
Nairobi, B	1 17.3 S	36 49	Jul 28, 31	11.3, 14.9	2 59.8 W	....	....	15.5	.30815	18	....	AW
			Jul 29, 31	12.1, 12.4	2 57.6 W	15.8	26 22.6 S	15.1	.30831	18	EI 18	AW
			Jul 30, 31	....	....	11.3	26 17.9 S	10.4	.30835	18	EI 18	AW
			Sep 19, 34	13.0, 14.8	2 52.8 W	11.9, 15.4	26 18.0 S	13.4, 14.3	.30898	18	EI 18	RHM
Mombasa	4 03.2 S	39 41	Sep 27, 34	11.1 to 14.0 (4)	2 50.0 W	10.3 to 14.6 (4)	31 31.7 S	12.0, 13.0	.29570	18	EI 18	RHM
			Sep 28, 34	8.9, 10.7	2 54.6 W	8.4, 11.1	31 27.8 S	9.4, 10.2	.29574	18	EI 18	RHM
Mombasa, test point	4 03.2 S	39 41	Sep 28, 34	13.3	2 51.4 W	12.8	31 26.9 S	....	....	18	EI 18	RHM

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[a] British Ordnance Survey coil-magnetometer.

AFRICA

Nigeria

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Dikoa	12 02.1 N	13 54	Jan 10, '27	8.9, 9.9	6 51.4 W	7.8, 8.0	5 39.8 N	9.2, 9.6	.33174	26	EI 26	JES
Maidugari, B	11 50.9 N	13 08	Jan 8, 27	10.4, 11.5	7 10.1 W	16.3, 16.5	4 57.0 N	10.7, 11.2	.32927	26	EI 26	JES
Maidugari, A	11 50.7 N	13 08	Jan 6, 27	15.0, 16.1	7 08.1 W	14.2, 14.4	4 55.0 N	15.3, 15.8	.32871	26	EI 26	JES
			Jan 7, 27	10.2, 11.5	7 08.1 W	8.1, 8.3	4 59.1 N	10.6, 11.2	.33042	26	EI 26	JES
Dambam	11 40.7 N	10 40	Jan 4, 27	13.6, 14.8	7 39.0 W	12.7, 12.9	4 54.6 N	14.0, 14.6	.32758	26	EI 26	JES

Northern Rhodesia

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Abercorn	8 49.2 S	31 14	Nov 12, '30	10.7, 17.6	6 44.7 W	....	....	....	....	18	....	AW
			Nov 13, 30	....	....	10.4, 13.6	41 33.8 S	14.6	.25788	18	EI 18	AW
			Nov 14, 30	9.0, 9.6	6 44.2 W	10.4	41 39.2 S	14.6	.25856	18	EI 18	AW
Livingstone, A	17 51.2 S	25 52	Mar 20, 35	10.6 to 15.4 (4)	12 57.9 W	13.5	54 40.8 S	11.2 to 15.0	.19872	18	EI 18	RHM
Livingstone, Secondary	17 51.2 S	25 52	Mar 19, 35	12.2	12 56.7 W	10.8	54 41.9 S	....	....	18	EI 18	RHM
			Mar 22, 35	11.4	12 55.2 W	10.9	54 41.1 S	....	....	18	EI 18	RHM
Livingstone, B	17 52.5 S	25 52	Mar 23, 35	10.4 to 14.7 (4)	13 00.6 W	9.9, 15.1	55 14.8 S	11.1 to 14.3	.19472	18	EI 18	RHM

Portuguese East Africa

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Mozambique B	15 01.8 S	40 44	Oct 17, '34	9.5, 12.0	6 12.8 W	8.7, 12.5	50 29.0 S	10.3, 11.4	.22324	18	EI 18	RHM
			Oct 18, 34	9.4, 11.4	6 11.9 W	8.8	50 30.0 S	9.9, 10.9	.22316	18	EI 18	RHM
			Oct 18, 34	12.4, 14.0	6 08.6 W	11.7, 12.0	50 27.6 S	12.8, 13.6	.22307	18	EI 18	RHM
Mozambique, C Auxiliary	15 01.8 S	40 44	Oct 13, 34	11.4, 15.5	5 46.4 W	9.3	51 16.0 S	14.2, 15.0	.21884	18	EI 18	RHM
			Oct 14, 34	9.4, 11.4	5 53.3 W	8.8, 11.8	51 16.7 S	9.9, 11.0	.21892	18	EI 18	RHM
Mozambique, Secondary A	15 01.8 S	40 44	Oct 15, 34	....	....	10.6	50 30.5 S	....	....	...	EI 18	RHM
Mozambique, Secondary B	15 01.8 S	40 45	Oct 19, 34	....	....	9.0	50 56.3 S	....	....	...	EI 18	RHM
Mozambique, Secondary C	15 01.8 S	40 44	Oct 19, 34	....	....	9.7	50 20.8 S	....	....	...	EI 18	RHM
Mozambique, Secondary D	15 01.8 S	40 44	Oct 19, 34	....	....	10.4	50 26.7 S	....	....	...	EI 18	RHM
Beira, E	19 49.2 S	34 51	Nov 2, 34	13.6, 15.3	10 30.2 W	13.0, 15.6	56 43.1 S	14.1, 14.9	.19164	18	EI 18	RHM
Beira, D	19 49.7 S	34 50	Oct 31, 34	11.2, 13.1	10 28.1 W	10.5, 14.0	56 44.0 S	11.7, 12.7	.19154	18	EI 18	RHM
			Nov 1, 34	9.4, 11.3, 13.7	10 30.4 W	8.8, 13.2	56 44.0 S	10.3, 14.1	.19146	18	EI 18	RHM
Beira, C	19 49.8 S	34 51	Jun 22, 30	10.5, 14.0, 15.2	10 42.5 W	15.8, 16.1	56 23.9 S	11.1, 14.7	.19445	13	EI 13	ENG
Beira, B	19 49.9 S	34 50	Jun 21, 30	13.9, 16.3	10 39.3 W	16.0	56 25.0 S	14.3, 15.5	.19440	13	EI 13	ENG
			Oct 29, 34	11.0, 13.7	10 30.6 W	10.2, 14.1	56 45.0 S	11.7, 12.8	.19140	18	EI 18	RHM
			Oct 30, 34	9.0, 11.0	10 32.1 W	8.4, 11.4	56 44.4 S	9.5, 10.5	.19140	18	EI 18	RHM
			Oct 30, 34	13.0, 14.8	10 28.5 W	12.7, 15.1	56 44.8 S	13.5, 14.3	.19141	18	EI 18	RHM
Pessene, A	25 41.5 S	32 21	Jun 16, 30	13.9, 14.1	10 16.2 W	12.1, 12.4	61 32.2 S	14.6, 15.8	.16566	13	EI 13	ENG
			Jun 16, 30	16.3	10 22.9 W	....	....	....	....	13	....	ENG

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Portuguese East Africa--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Pessene, B	25 41.5 S	32 21	Dec 4, '34	15.3	15 18.3 W	13.6	61 53.2 S	....	....	18	EI 18	RHM
			Dec 5, 34	11.2, 13.2	15 20.6 W	10.5	61 51.2 S	11.8, 12.8	.16252	18	EI 18	RHM
			Dec 5, 34	14.2, 16.0	15 20.8 W	13.8, 13.9	61 51.6 S	14.7, 15.6	.16256	18	EI 18	RHM
Pessene, C	25 41.5 S	32 21	Dec 6, 34	12.1, 14.5	15 23.6 W	11.4	61 53.3 S	13.1, 14.1	.16248	18	EI 18	RHM
Lourenço Marques, C	25 57.7 S	32 36	Nov 29, 34	11.2, 13.2	16 36.4 W	10.7, 13.9	61 56.4 S	11.7, 12.7	.16537	18	EI 18	RHM
			Nov 30, 34	9.2, 11.5	16 42.6 W	8.6, 13.2	61 55.4 S	10.1, 11.1	.16548	18	EI 18	RHM
			Nov 30, 34	13.8, 15.5	16 36.0 W	13.4, 15.8	61 55.6 S	14.2, 15.1	.16536	18	EI 18	RHM
Lourenço Marques, D	25 57.7 S	32 36	Dec 1, 34	9.1, 11.2	16 39.6 W	8.5, 13.0	61 53.0 S	9.8, 10.8	.16571	18	EI 18	RHM
			Dec 1, 34	13.6, 15.4	16 36.0 W	13.2, 15.7	61 54.7 S	14.1, 15.0	.16539	18	EI 18	RHM
Lourenço Marques, B	25 57.8 S	32 36	Nov 26, 34	10.6, 12.8	16 39.5 W	9.8, 13.8	61 57.2 S	11.4, 12.3	.16492	18	EI 18	RHM
			Nov 28, 34	9.4, 11.4	16 39.0 W	8.8, 11.7	61 56.2 S	10.0, 10.9	.16517	18	EI 18	RHM
			Nov 28, 34	13.7, 15.4	16 36.6 W	13.3, 15.7	61 57.8 S	14.1, 15.0	.16498	18	EI 18	RHM
Lourenço Marques, A	25 58.1 S	32 36	Jun 13, 30	15.0 to 16.4 (4)	17 56.8 W	....	....	15.8, 16.0	.17054	13	....	ENG
			Jun 18, 30	11.5, 12.4	17 57.6 W	....	....	11.5, 12.4	.17044	13	....	ENG
			Nov 12, 34	15.1	17 49.6 W	14.2	61 43.4 S	15.9	.16695	18	EI 18	RHM
			Nov 14, 34	10.0, 12.0	17 55.6 W	8.6	61 41.1 S	10.6, 11.5	.16726	18	EI 18	RHM
			Nov 14, 34	15.0, 16.9	17 50.3 W	14.3, 17.3	61 41.6 S	15.5, 16.5	.16704	18	EI 18	RHM
Matola	25 58.7 S	32 30	Jun 14, 30	11.4, 15.3	15 57.0 W	12.2, 12.4	60 57.5 S	15.8	.16883	13	EI 13	ENG
Boane	26 02.5 S	32 20	Jun 15, 30	15.8, 17.0, 17.2	15 50.3 W	13.0, 13.2	61 35.8 S	16.2, 16.8	.16642	13	EI 13	ENG

Southern Rhodesia

	° ′	° ′		h h h	° ′ ′	h h	° ′	h h	c.g.s			
Salisbury, B	17 48.2 S	31 04	Jul 1, '30	11.7, 11.9, 12.1	9 26.4 W	14.8, 15.1	54 46.7 S	12.3	.20006	13	EI 13	ENG
			Mar 28, 35	11.6, 13.4	9 09.8 W	11.0	55 17.6 S	12.2, 13.0	.19638	18	EI 18	RHM
Salisbury, A	17 49.5 S	31 03	Mar 27, 35	10.5, 12.4	8 37.0 W	10.0	55 04.5 S	11.0, 11.9	.19484	18	EI 18	RHM
			Mar 27, 35	13.0, 15.1	8 34.4 W	....	....	13.6, 14.5	.19461	18	....	RHM
			Jun 28, 30	11.8, 12.1, 15.2	9 01.1 W	....	....	12.5, 14.6	.19800	13	....	ENG
Salisbury, C	17 50.4 S	31 04	Jul 2, 30	10.6, 10.8, 11.4	11 00.7 W	12.0	54 04.0 S	10.8, 11.4	.20160	13	....	ENG
Salisbury, D	17 51.4 S	31 03	Mar 29, 35	11.0	10 49.9 W	8.9	55 29.5 S	12.8	.19435	18	EI 18	RHM
Victoria Falls	17 55.9 S	25 51	Jul 11, 30	13.7, 17.2	13 11.4 W	....	....	15.2, 16.9	.20117	13	....	ENG
			Jul 12, 30	17.6	13 12.3 W	7.8 to 8.6 (3)	54 0.8 S	....	....	13	EI 13	G-V
			Jul 14, 30	7.6 to 17.2 (dv)	13 11.5 W	....	....	7.6 to 17.2	.20123	13	....	G-V
			Jul 15, 30	....	....	11.7 to 16.2 (3)	54 20.0 S	....	....	...	EI 13	G-V
Victoria Falls, A	17 55.9 S	25 51	Mar 12, 35	10.2, 12.1	12 46.6 W	8.8, 12.5	55 04.0 S	10.7, 11.6	.19660	18	EI 18	RHM
Victoria Falls, B	17 55.9 S	25 51	Mar 12, 35	16.0	12 28.4 W	14.6	55 04.5 S	....	....	18	EI 18	RHM
			Mar 13, 35	10.2, 12.3	12 34.6 W	....	....	10.8, 11.8	.19676	18	....	RHM
Victoria Falls, C	17 55.9 S	25 51	Mar 11, 35	14.7	12 46.9 W	14.0	55 12.8 S	16.8	.19581	18	EI 18	RHM
Victoria Falls, D	17 56.0 S	25 51	Mar 13, 35	....	....	14.8	55 08.4 S	....	....	...	EI 18	RHM
			Mar 14, 35	10.7, 13.0	13 07.4 W	9.0	55 07.4 S	11.4, 12.5	.19591	18	EI 18	RHM

AFRICA

Southern Rhodesia--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Hartley, A	18 08.5 S	30 09	Jul 3, '30	10.7	11 40.6 W	16.6, 17.2	54 30.7 S	12.0, 14.7	.20185	13	EI 13	G-V
			Jul 3, 30	15.7	11 36.4 W	....	....	....	....	13	....	TV
			Jul 4, 30	7.1 to 17.5 (dv)	11 37.0 W	....	....	7.1 to 17.5	.20172	13	....	G-V
			Jul 5, 30	....	....	7.5 to 16.8 (dv)	54 29.8 S	....	....	...	EI 13	G-V
Hartley, B	18 08.6 S	30 09	Jul 6, 30	9.3, 12.4, 12.5	11 38.8 W	14.0	54 26.4 S	10.2, 11.9	.20214	13	EI 13	G-V
Umtali	18 59.4 S	32 43	Jun 25, 30	10.6	10 39.2 W	13.2, 13.4	55 07.2 S	11.2	.20152	13	EI 13	ENG
			Jun 25, 30	17.2, 17.4	10 34.8 W	....	....	16.7	.20142	13	....	ENG
			Jun 26, 30	17.0 (dv)	10 35.1 W	....	....	8.1 to 17.0	.20131	13	....	ENG
Bulawayo, E	20 07.9 S	28 36	Mar 6, 35	11.2, 14.9	12 51.4 W	10.6, 15.3	56 51.4 S	13.4, 14.4	.18871	18	EI 18	RHM
Bulawayo, C	20 08.9 S	28 35	Mar 3, 35	12.4, 14.5	12 53.3 W	11.7, 14.9	56 48.4 S	13.0, 14.0	.18866	18	EI 18	RHM
Bulawayo, Hut, A	20 09.0 S	28 36	Jul 8, '30	10.3, 12.5, 15.8	13 07.2 W	13.0	56 20.2 S	10.8, 12.1	.19217	13	EI 13	ENG
			Jul 9, 30	8.4 to 17.7 (dv)	13 07.2 W	....	....	8.4 to 17.7	.19230	13	....	G-V
			Feb 26, 35	14.4, 16.9	12 42.8 W	12.4, 17.2	56 56.2 S	15.3, 16.4	.18806	18	EI 18	RHM
			Feb 27, 35	....	....	6.0 to 18.3 (dv)	56 53.7 S	....	....	...	EI 18	RHM
			Feb 28, 35	7.1	12 46.8 W	....	....	....	....	18	....	RHM
			Feb 28, 35	6.2 to 18.2 (dv)	12 44.7 W	....	....	6.2 to 18.2	.18837	18	....	RHM
Bulawayo, D	20 09.8 S	28 35	Mar 5, 35	11.6, 14.9	13 05.6 W	11.1, 15.5	56 49.8 S	13.4, 14.4	.18943	18	EI 18	RHM

South-West Africa

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Tsumeb	19 14.5 S	17 43	Jan 5, '29	10.2, 12.1	18 09.8 W	6.8, 7.1	53 08.8 S	10.6, 11.7	.19992	13	EI 13	ENG
Otavi	19 38.2 S	17 28	Jan 2, 29	10.2, 12.2	18 22.6 W	7.1, 7.4	53 35.4 S	10.7, 11.8	.19756	13	EI 13	ENG
Kalkfeld, A	20 53.4 S	16 13	Dec 31, 28	9.7, 11.8	19 09.4 W	16.4, 16.7	54 38.2 S	10.2, 11.4	.19262	13	EI 13	ENG
Kalkfeld, B	20 53.4 S	16 13	Jan 8, 29	....	....	6.5 to 10.0 (8)	54 57.3 S	....	....	...	EI 13	ENG
			Jan 9, 29	6.3 to 18.0 (dv)	20 22.1 W	....	....	6.3 to 18.0	.19007	13	....	ENG
			Jan 10, 29	10.0	20 20.8 W	....	....	10.6	.19025	13	....	ENG
Kalkfeld, C	20 53.4 S	16 13	Jan 10, 29	7.1	20 39.4 W	6.7	54 45.3 S	....	....	13	EI 13	ENG
			Jan 10, 29	15.7	20 34.6 W	....	....	....	....	13	....	ENG
Karibib	21 56.2 S	15 51	Jan 24, 29	14.0, 16.5	20 07.0 W	....	....	14.9, 16.1	.18850	13	....	ENG
			Jan 25, 29	....	....	6.8 to 14.4 (4)	55 21.1 S	....	....	...	EI 13	ENG
Windhoek, A	22 32.5 S	17 05	Dec 22, 28	15.4	19 59.7 W	....	....	16.0	.18604	13	....	ENG
			Dec 23, 28	6.6 to 18.0 (dv)	20 00.7 W	....	....	6.6 to 18.0	.18620	13	....	ENG
			Dec 24, 28	15.5, 17.0	20 00.9 W	11.5, 11.9	56 03.0 S	15.9, 16.7	.18580	13	EI 13	ENG
			Dec 27, 28	....	....	11.8	56 02.1 S	....	....	...	EI 13	ENG
Windhoek, B	22 32.5 S	17 04	Dec 28, 28	10.4, 12.6, 15.4	19 59.4 W	9.4, 9.7	56 00.3 S	11.1, 12.2	.18622	13	EI 13	ENG
Swakopmund, A	22 41.0 S	14 32	Jan 16, 29	10.4, 16.9	20 45.5 W	15.0, 15.3	55 16.8 S	11.0, 11.3	.18860	13	EI 13	ENG
			Jan 17, 29	7.6	20 52.2 W	8.4, 8.7	55 17.6 S	....	....	13	EI 13	ENG

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South-West Africa--concluded

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Swakopmund, B	22 41.0 S	14 32	Jan 17, '29	14.6, 16.6	20 55.0 W	17.3	55 08.2 S	15.2, 16.2	.18998	13	EI 13	ENG
			Jan 18, 29	....	....	8.1 to 16.0 (dv)	55 07.9 S	....	....	...	EI 13	ENG
			Jan 22, 29	6.8 to 18.4 (dv)	20 56.3 W	....	....	6.8 to 18.4	.18993	13	....	ENG
Gibeon	25 07.2 S	17 42	Jan 27, 29	10.3	21 13.1 W	15.5, 15.9	55 12.9 S	10.8	.17606	13	EI 13	ENG
			Jan 27, 29	14.5	21 01.1 W	....	....	14.0	.17617	13	....	ENG
Mount Brukkaros, A	25 51.2 S	17 48	Jan 31, 29	7.6, 10.9	21 21.0 W	....	....	11.4	.17451	13	....	ENG
			Jan 31, 29	15.4	21 11.2 W	....	....	15.0	.17415	13	....	ENG
			Feb 1, 29	6.5 to 18.0 (dv)	21 15.7 W	....	....	6.5 to 18.0	.17420	13	....	ENG
			Feb 2, 29	....	....	16.1	58 44.1 S	....	....	...	EI 13	ENG
			Feb 3, 29	....	....	7.0 to 18.0 (6)	58 42.6 S	....	....	...	EI 13	ENG
Mount Brukkaros, B	25 51.2 S	17 48	Feb 4, 29	14.6, 16.2	21 11.2 W	12.1, 12.3	58 38.8 S	15.0, 16.8	.17426	13	EI 13	ENG
Keetmanshoop	26 34.7 S	18 04	Feb 8, '29	14.8, 16.7	21 30.8 W	....	....	15.2, 16.2	.17186	13	....	ENG
			Feb 9, 29	....	....	11.3, 11.6	59 04.0 S	....	....	...	EI 13	ENG
Luderitzbucht	26 39.4 S	15 09	Feb 11, 29	10.6	22 57.6 W	16.0, 16.3	58 21.6 S	11.0, 12.0	.17507	13	EI 13	ENG
			Feb 11, 29	12.4, 17.4	22 51.2 W	....	....	....	....	13	....	ENG
			Feb 12, 29	8.2 to 17.5 (dv)	22 51.8 W	9.7, 15.1	58 18.7 S	8.2 to 17.5	.17509	13	EI 13	ENG
Aus, A	26 40.2 S	16 16	Feb 16, 29	9.9, 12.0	22 25.2 W	8.6, 8.8	58 34.0 S	10.4, 11.6	.17352	13	EI 13	ENG
			Feb 16, 29	14.5, 16.3	22 12.4 W	13.9	58 30.9 S	15.0, 15.9	.17326	13	EI 13	ENG
Aus, B	26 40.3 S	16 16	Feb 17, 29	10.0, 12.3	22 18.4 W	9.2, 9.5	58 37.2 S	10.4, 11.4	.17287	13	EI 13	ENG
			Feb 17, 29	....	....	14.2, 14.4	58 44.4 S	....	....	...	EI 13	ENG
Seeheim	26 48.5 S	17 48	Feb 19, 29	10.3, 12.4, 15.4	22 01.9 W	9.2, 9.5	59 27.7 S	10.8, 11.9	.17058	13	EI 13	ENG

Tanganyika

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s			
Arusha	3 22.0 S	36 47	Oct 5, '30	18.1	3 25.6 W	....	....	13.1	.29529	18	....	AW
Tabora, A	5 01.0 S	32 49	Aug 29, 34	14.7, 16.8	4 59.1 W	13.8, 17.4	34 33.7 S	15.2, 16.2	.28286	18	EI 18	RHM
			Aug 30, 34	15.2, 17.1	4 57.5 W	9.2	34 33.3 S	15.7, 16.6	.28280	18	EI 18	RHM
Tabora, C	5 01.2 S	32 50	Aug 15, 34	10.0, 14.5	5 03.6 W	11.2, 13.3	34 35.5 S	10.4, 14.0	.28306	18	EI 18	WAG
			Aug 27, 34	14.1, 17.6	5 04.4 W	13.1	34 35.7 S	15.6, 17.0	.28265	18	EI 18	RHM
			Aug 28, 34	11.7, 15.2, 17.3	5 04.8 W	9.0	34 38.3 S	15.8, 16.8	.28240	18	EI 18	RHM
Tabora, B	5 01.8 S	32 50	Aug 13, 34	10.2, 14.8	4 59.3 W	11.9, 13.8	34 33.7 S	10.8, 14.4	.28334	18	EI 18	WAG
			Aug 17, 34	9.4, 11.4	4 59.8 W	10.4, 10.6	34 38.1 S	9.8, 11.1	.28308	18	EI 18	WAG
			Aug 31, 34	11.3, 11.5	4 57.4 W	10.4, 10.6	34 32.4 S	14.3, 15.4	.28325	18	EI 18	RHM
			Aug 31, 34	13.8, 15.9	4 56.7 W	13.1, 16.4	34 33.6 S	....	....	18	EI 18	RHM
Dar es Salaam	6 49.0 S	39 19	Oct 6, 34	11.4, 13.4	3 34.6 W	10.9, 13.8	37 04.3 S	11.9, 12.8	.27848	18	EI 18	RHM
			Oct 7, 34	9.6, 11.4	3 37.6 W	7.9, 11.9	37 06.6 S	10.1, 11.0	.27820	18	EI 18	RHM

AFRICA

Tripolitania

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Tripoli, A	32 53.9 N	13 12	Jun 6, '35	10.4, 12.2	4 56.8 W	8.7, 13.4	46 26.6 N	10.9, 11.8	.28013	18	EI 18	RHM
			Jun 6, 35	13.8, 17.4	4 57.6 W	....	....	16.4, 17.0	.27986	18	....	RHM
Tripoli, B	32 51.7 N	13 11	Jun 7, 35	10.4, 11.8	5 04.6 W	8.5, 13.4	46 29.4 N	10.8, 11.5	.28022	18	EI 18	RHM

Tunisia

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Tunis, A	36 45.4 N	10 07	Jun 17, '35	10.1, 13.0	5 46.6 W	9.6, 13.6	51 51.0 N	10.8, 11.5	.25968	18	EI 18	RHM
			Jun 17, 35	14.3, 15.8	5 47.1 W	13.8, 16.1	51 50.5 N	14.6, 15.4	.25966	18	EI 18	RHM
Tunis, B	36 45.4 N	10 06	Jun 18, 35	12.7, 14.5	5 50.3 W	11.3, 14.8	51 54.0 N	13.4, 14.1	.25931	18	EI 18	RHM

Uganda

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Hoima	1 25.6 N	31 22	Feb 17, '34	18.3	3 45.6 W	....	....	....	....	OS^a	....	ECB
			Feb 18, 34	9.1, 9.6	3 44.2 W	8.5	20 51.2 S	9.4	.31805	OS^a_a	EI 18	ECB
Fort Portal	0 40.0 N	30 17	Feb 14, 34	14.6, 15.2	4 03.7 W	13.8	22 48.4 S	15.0	.31582	OS	EI 18	ECB
Jinja	0 25.2 N	33 12	Jan 14, 34	12.3, 13.3	3 38.8 W	9.2	22 49.7 S	13.0	.31715	OS^a	EI 18	ECB
			Jan 14, 34	11.5, 13.6	3 38.8 W	....	....	....	....	18	....	ECB
Kampala, Kololo Hill	0 20.0 N	32 35	Feb 19, 33	10.3	3 43.5 W	9.9	22 59.1 S	....	....	18	EI 18	AW
			Feb 20, 33	12.5	3 41.6 W	6.9	23 03.0 S	13.0	.31219	18	EI 18	AW
			Feb 21, 33	7.7	3 43.8 W	7.2	22 59.9 S	8.0	.31302	18	EI 18	AW
			Sep 6, 34	11.4, 15.7	3 40.4 W	....	....	....	....	18	....	RHM
			Sep 7, 34	11.1	3 41.0 W	12.0	23 03.1 S	....	....	18	EI 18	RHM
			Sep 8, 34	9.8, 12.4	3 41.0 W	9.1 to 15.8 (4)	23 03.9 S	11.0, 11.9	.31386	18	EI 18	RHM
			Sep 10, 34	7.4, 9.2	3 39.4 W	....	....	7.8, 8.7	.31356	18	....	RHM
Kampala, 1933	0 18.8 N	32 36	Feb 16, 33	11.6, 15.7	3 37.0 W	7.6	22 58.1 S	12.8, 16.2	.31234	18	EI 18	AW
			Feb 17, 33	....	....	7.3	22 56.6 S	....	....	...	EI 18	AW
Kampala, 1934	0 18.6 N	32 34	Jan 7, 34	11.3	3 36.7 W	11.9	22 59.8 S	....	....	18	EI 18	ECB
			Jan 7, 34	9.8, 10.9	3 40.3 W	....	....	10.6	.31404	OS^a	....	ECB
			Feb 19, 34	10.5, 11.5	3 38.8 W	....	....	11.1	.31381	OS^a	....	ECB
Entebbe	0 04.0 N	32 28	Sep 11, 34	11.2, 13.6	3 53.3 W	9.3, 14.0	23 43.2 S	11.7, 13.0	.31202	18	EI 18	RHM
Kichwamba	0 15.1 S	30 05	Feb 11, 34	11.6, 12.4	4 37.8 W	13.9	24 38.5 S	12.1	.30714	OS^a	EI 18	ECB

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	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Potgietersrust, A	24 11.0 S	29 01	Jun 3, '30	14.1, 17.2	15 52.0 W	12.8, 13.1	59 50.0 S	15.6, 16.8	.17318	13	EI 13	ENG
Potgietersrust, B	24 11.0 S	29 01	Jun 4, 30	12.0, 14.5	15 33.4 W	16.7	59 57.0 S	12.4, 14.0	.17214	13	EI 13	ENG
			Jun 5, 30	7.1 to 17.0 (dv)	15 33.5 W	....	....	7.1 to 17.0	.17237	13	....	ENG
			Jun 6, 30	....	....	7.3 to 16.4 (dv)	59 53.4 S	....	....	...	EI 13	ENG

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[a] British Ordnance Survey coil-magnetometer.

AFRICA

Union of South Africa--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Machadodorp	25 39.9 S	30 15	Jun 10, '30	14.7, 17.2	15 37.7 W	12.3, 12.6	61 17.5 S	15.2, 16.5	.16550	13	EI 13	ENG
Pretoria, D	25 44.9 S	28 16	Jan 28, 35	10.9, 12.9	16 44.8 W	8.5	61 26.9 S	11.4, 12.4	.16290	18	EI 18	RHM
			Jan 28, 35	14.4, 16.1	16 42.6 W	14.0	61 28.6 S	14.9, 15.7	.16300	18	EI 18	RHM
Pretoria, E	25 44.9 S	28 16	Jan 30, 35	10.8, 12.7	16 45.6 W	10.2	61 25.9 S	11.3, 12.2	.16298	18	EI 18	RHM
Pretoria, A	25 45.0 S	28 10	Jun 7, 30	14.5, 16.3	16 49.6 W	....	....	14.9, 15.9	.16674	13	....	ENG
			Jun 8, 30	10.9	16 51.1 W	11.9, 12.3	61 04.0 S	....	....	13	EI 13	ENG
Pretoria, B	25 45.0 S	28 10	Jan 24, 35	11.0, 13.1	16 49.1 W	10.3	61 25.2 S	11.7, 12.6	.16280	18	EI 18	RHM
			Jan 24, 35	14.3, 15.9	16 46.9 W	13.8, 16.2	61 25.6 S	14.7, 15.5	.16281	18	EI 18	RHM
Pretoria, C	25 45.0 S	28 10	Jan 25, 35	11.0, 12.8	16 32.4 W	10.2	61 51.3 S	11.5, 12.4	.16184	18	EI 18	RHM
			Jan 25, 35	14.3, 16.0	16 28.0 W	13.9	61 50.4 S	14.7, 15.5	.16214	18	EI 18	RHM
Mafeking, A	25 51.8 S	25 39	Jul 18, 30	11.4, 12.9	18 02.0 W	14.9 to 16.1 (3)	60 21.0 S	12.2	.16784	13	EI 13	ENG
			Jul 19, 30	7.1 to 16.7 (dv)	18 02.8 W	....	....	7.1 to 16.7	.16780	13	....	G-V
			Feb 18, 35	11.7, 13.6	17 45.8 W	11.1, 14.0	61 09.2 S	12.2, 13.1	.16327	18	EI 18	RHM
			Feb 19, 35	9.3, 11.3	17 51.4 W	8.7, 11.7	61 07.2 S	9.8, 10.8	.16350	18	EI 18	RHM
			Feb 19, 35	13.6, 15.2	17 47.8 W	13.2, 15.4	61 07.7 S	14.0, 14.8	.16350	18	EI 18	RHM
Mafeking, B	25 51.8 S	25 39	Feb 20, 35	14.3, 15.9	17 48.2 W	13.8	61 05.8 S	14.8, 15.6	.16366	18	EI 18	RHM
Johannesburg[c]	26 21.7 S	27 34	Feb 14, 35	11.1	16 57.2 W	10.5	62 08.5 S	12.4, 13.4	.15859	18	EI 18	RHM
Warrenton	28 07.1 S	24 53	Jul 21, 30	10.9	19 54.5 W	14.9, 15.3	62 04.1 S	....	....	13	EI 13	ENG
			Jul 21, 30	11.4, 16.2	19 51.4 W[d]	....	....	11.4, 16.2	.15992[e]	13	....	G-V
Bethlehem, A[f]	28 14.0 S	28 17	Jul 9, 28	....	....	16.8, 17.0	63 04.8 S	....	....	...	EI 13	ENG
			Jul 10, 28	11.2, 12.9	17 23.6 W	10.1, 10.4	63 00.6 S	11.7, 12.6	.15923	13	EI 13	ENG
			Jul 10, 28	14.8, 16.3	17 19.9 W	....	....	15.2, 16.0	.15933	13	....	ENG
Bethlehem, B[f]	28 14.3 S	28 18	Jul 11, 28	10.0, 11.6, 14.7	18 24.0 W	12.7	61 46.4 S	10.5, 11.2	.16558	13	EI 13	ENG
Karree, A	28 52.6 S	26 21	Jan 30, 28	....	....	18.8	62 11.2 S	....	....	...	EI 13	ENG
			Jan 31, 28	9.3, 12.6	18 12.6 W	....	....	9.8, 11.7	.16058	13	....	ENG
Karree, B	28 52.7 S	26 21	Feb 1, 28	9.8, 12.2	18 05.7 W	....	....	10.4, 11.7	.16004	13	....	ENG
			Feb 2, 28	15.2, 17.2	17 59.8 W	9.4, 12.7	62 18.2 S	15.6, 16.7	.15975	13	EI 13	ENG
Gingindhlovu, A	29 02.0 S	31 35	Jul 13, 28	16.0	17 31.3 W	13.5, 13.9	63 06.8 S	16.4	.15807	13	EI 13	ENG
			Jul 14, 28	10.5, 12.6	17 40.2 W	16.9	63 05.2 S	11.0, 12.2	.15826	13	EI 13	ENG
			Jul 15, 28	....	....	8.0 to 17.0 (dv)	63 04.2 S	....	....	...	EI 13	ENG
			Jul 16, 28	7.7 to 16.9 (dv)	17 33.1 W	....	....	7.7 to 16.9	.15833	13	....	ENG
Gingindhlovu, B	29 02.0 S	31 35	Jul 16, 28	11.9, 12.5	17 38.2 W[g]	....	....	11.9, 12.5	.15755[g]	13	....	ENG
Bloemfontein, A	29 07.2 S	26 12	Jan 25, 28	14.8, 17.7	19 44.4 W	....	....	15.4, 17.1	.15914	13	....	ENG
			Jan 26, 28	....	....	8.6 to 16.7 (dv)	62 25.5 S	....	....	...	EI 13	ENG
			Jan 27, 28	10.8	19 47.8 W	....	....	....	....	13	....	ENG
Bloemfontein, B (Secondary)	29 07.2 S	26 12	Jan 25, 28	18.0	19 50.2 W	....	....	....	....	13	....	ENG
			Jan 27, 28	11.6	19 40.4 W	....	....	....	....	13	....	ENG
Mooi River	29 13.1 S	30 00	Jul 8, 28	11.5	17 51.7 W	8.3, 8.7	62 54.0 S	12.0	.15707	13	EI 13	ENG
Orange River, A	29 40.0 S	24 12	Jan 17, 28	11.4, 11.7	20 36.0 W	....	....	....	....	13	....	ENG
			Jan 18, 28	9.5, 11.8	20 39.4 W	....	....	10.0, 11.3	.15998	13	....	ENG
			Jan 19, 28	7.0 to 17.6 (dv)	20 36.9 W	....	....	7.0 to 17.1	.15981	13	....	ENG
			Jan 20, 28	....	....	7.1, 7.5	62 14.0 S	....	....	...	EI 13	ENG

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[c] Thirty-three miles (53 kilometers) southwest of city. [d] Combined declination and oscillation method. [e] From oscillations only. [f] Local disturbance.
[g] From deflection at one distance only.

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Union of South Africa--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Orange River, A--concluded	29 40.0 S	24 12	Jul 22, '30	15.4	20 24.7 W	....	....	....	....	13	....	ENG
			Jul 22, 30	15.8	20 25.7 W^d	....	....	15.8	.15657^d	13	....	ENG
			Jul 23, 30	10.8	20 33.7 W^d	8.4	62 19.8 S	10.8	.15684^d	13	EI 13	ENG
			Jul 2, 34	14.8 to 15.9 (4)	20 16.9 W	....	....	....	....	16	....	RHM
			Jul 3, 34	10.4 to 13.4 (4)	20 18.4 W	....	....	11.3, 12.3	.15286	16	....	RHM
			Jul 3, 34	13.7 to 16.3 (4)	20 15.8 W	....	....	14.6, 15.6	.15271	16	....	RHM
			Jul 5, 34	....	....	9.8 to 11.3 (6)	62 59.4 S	....	....	...	EI 16	RHM
Orange River, B	29 40.3 S	24 12	Jan 21, 28	9.9, 12.2	20 34.2 W	....	....	10.4, 11.7	.15994	13	....	ENG
			Jan 22, 28	....	....	7.3, 7.8	62 17.2 S	....	....	...	EI 13	ENG
			Jul 9, 34	15.8, 16.4	20 16.1 W	....	....	....	....	16	....	RHM
			Jul 10, 34	10.0, 12.5	20 21.2 W	13.7 to 16.1 (6)	63 02.6 S	10.7, 11.7	.15294	16	EI 16	RHM
			Jul 11, 34	10.8, 13.0	20 18.9 W	....	....	11.5, 12.3	.15288	16	....	RHM
Durban, 1928	29 52.6 S	31 03	Jul 2, 28	15.3	17 51.8 W	....	....	15.8	.15402	13	....	ENG
			Jul 3, 28	14.6	17 56.4 W	....	....	15.1	.15406	13	....	ENG
			Jul 4, 28	7.4 to 17.0 (dv)	17 59.8 W	....	....	7.4 to 17.0	.15404	13	....	ENG
			Jul 5, 28	....	....	8.0 to 16.6 (dv)	63 33.4 S	....	....	...	EI 13	ENG
			Jul 31, 34	12.1 to 13.8 (6)	17 59.5 W	15.9 to 16.7 (4)	64 08.0 S	....	....	16	EI 16	RHM
			Aug 1, 34	10.4, 14.4, 14.7	17 55.3 W	15.9, 16.2	64 05.9 S	12.8, 13.8	.14824	16	EI 16	RHM
			Aug 2, 34	10.7, 13.6	17 59.5 W	....	....	11.9, 13.0	.14830	16	....	RHM
Springfontein	30 16.8 S	25 43	Feb 3, 28	15.2, 17.2	20 52.0 W	11.6, 11.9	63 08.8 S	15.8, 16.8	.15524	13	EI 13	ENG
De Aar	30 40.4 S	24 00	Jan 14, 28	15.2, 17.4	20 49.5 W	10.2, 11.5	62 14.4 S	15.8, 17.0	.15846	13	EI 13	ENG
Hutchinson, B	31 29.5 S	23 12	Jan 12, 28	14.5, 16.8	22 07.0 W	10.4, 11.0	62 34.4 S	15.0, 16.3	.15700	13	EI 13	ENG
Hutchinson, A	31 29.8 S	23 13	Jan 9, 28	....	....	11.1, 11.5	62 35.2 S	....	....	...	EI 13	ENG
			Jan 10, 28	9.5, 12.8	22 09.4 W	....	....	10.4, 12.1	.15726	13	....	ENG
			Jan 11, 28	15.0, 17.6	22 03.8 W	7.6, 7.9	62 36.0 S	15.7, 17.0	.15726	13	EI 13	ENG
			Jul 24, 30	10.8	22 06.0 W	14.9	62 29.0 S	11.2, 12.4	.15414	13	EI 13	ENG
			Jul 24, 30	11.8, 15.6	22 01.6 W^d	....	....	11.8, 15.6	.15416^e	13	....	ENG
Van Rhynsdorp	31 37.5 S	18 44	Feb 20, 30	14.6, 14.7	23 48.2 W	....	....	14.7	.15731	13	....	ENG
			Feb 21, 30	12.0, 12.2	23 49.4 W^d	....	....	12.0, 12.2	.15704^e	13	....	ENG
Queenstown	31 54.5 S	26 51	Feb 6, 28	10.6	21 18.7 W	17.4, 17.8	63 36.6 S	11.0, 11.9	.15357	13	EI 13	ENG
			Feb 6, 28	16.5	21 07.9 W	....	....	....	....	13	....	ENG
Cradock	32 10.2 S	25 37	Feb 16, 28	....	....	11.7, 12.0	63 34.9 S	16.4	.15397	13	EI 13	ENG
Beaufort West	32 21.0 S	22 36	Jan 7, 28	16.6, 18.3	22 42.8 W	11.6, 15.1	62 46.4 S	17.1, 17.9	.15580	13	EI 13	ENG
Eendekuil	32 41.2 S	18 52	Feb 19, 30	10.9, 12.8	24 03.2 W	6.7, 7.0	62 33.4 S	11.3, 12.4	.15534	13	EI 13	ENG
East London, B	33 00.0 S	27 56	Feb 12, 28	14.5, 16.9	21 04.2 W	11.7, 12.0	63 59.2 S	15.0, 16.3	.15122	13	EI 13	ENG
			Jul 25, 34	15.6 to 16.3 (4)	21 00.5 W	13.2 to 13.9 (4)	64 35.0 S	....	....	16	EI 16	RHM
			Jul 26, 34	13.4 to 15.8 (4)	21 02.8 W	....	....	14.1, 15.0	.14493	16	....	RHM
East London, A	33 00.3 S	27 56	Feb 8, 28	15.2	21 04.9 W	12.7, 13.1	64 10.6 S	15.8	.15035	13	EI 13	ENG
			Feb 9, 28	....	....	7.7 to 17.7 (dv)	64 10.3 S	....	....	...	EI 13	ENG
			Feb 10, 28	16.7	21 07.9 W	....	....	16.2	.15043	13	....	ENG

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[d] Combined declination and oscillation method. [e] From oscillations only.

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Union of South Africa--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s			
East London, A--concluded			Feb 11, '28	7.1 to 17.9 (dv)	21 13.5 W	....	....	7.1 to 17.6	.15032	13	....	ENG
			Jul 17, 34	12.4, 12.8, 15.5	21 05.2 W	....	....	13.5, 14.7	.14406	16	....	RHM
			Jul 18, 34	14.3 to 15.2 (4)	21 01.5 W	13.4, 15.6	64 40.9 S	....	....	16	EI 16	RHM
			Jul 23, 34	....	....	16.2	64 40.3 S	....	....	...	EI 16	RHM
			Jul 24, 34	13.2, 15.6	21 00.2 W	....	....	13.9, 15.0	.14420	16	....	RHM
Matjesfontein, A	33 14.5 S	20 35	Dec 31, 27	15.2, 17.9	24 05.0 W	....	....	15.8, 17.3	.15410	13	....	ENG
			Jan 1, 28	6.9, 10.9	24 09.0 W	....	....	7.4, 10.4	.15434	13	....	ENG
			Jan 3, 28	....	....	12.0, 12.5	62 53.5 S	....	....	...	EI 13	ENG
			Jan 4, 28	....	....	16.4, 16.9	62 50.9 S	....	....	...	EI 13	ENG
			May 31, 30	10.5, 12.8, 15.7	24 01.2 W	15.0, 15.3	63 30.8 S	11.0, 12.3	.15094	13	EI 13	ENG
			Jan 24, 33	11.3, 15.4	23 50.9 W	....	....	11.7, 14.9	.14840	17	....	ENG
			Jan 25, 33	9.6, 11.7	23 50.4 W	6.6, 7.0	63 43.9 S	10.0, 11.2	.14837	17	EI 17	ENG
			Jan 25, 33	14.1, 14.4, 14.7	23 50.0 W[d]	....	....	14.1 to 14.7	.14844[e]	17	....	ENG
Matjesfontein, B	33 14.6 S	20 35	Jan 3, 28	15.4, 18.3	24 07.0 W	....	....	16.2, 17.7	.15410	13	....	ENG
			Jan 4, 28	....	....	11.2, 11.6	62 41.6 S	....	....	...	EI 13	ENG
Willowmore	33 18.0 S	23 28	Feb 28, 28	15.9, 17.8	23 00.8 W	11.5	63 47.5 S	16.4, 17.3	.15132	13	EI 13	ENG
			Feb 29, 28	14.8	22 58.9 W	7.0, 7.5	63 46.4 S	....	....	13	EI 13	ENG
Wolseley, A Ceres Road	33 25.2 S	19 12	Feb 23, 30	14.0, 16.0	24 17.0 W	....	....	14.5, 15.5	.15405	13	....	ENG
			Feb 24, 30	....	....	9.0, 9.3	62 48.4 S	....	....	...	EI 13	ENG
Wolseley, B	33 25.2 S	19 12	Jan 26, 33	16.4, 18.2	24 10.4 W	....	....	16.8, 17.8	.15086	17	....	ENG
			Jan 27, 33	....	....	7.4, 7.7	63 10.6 S	....	....	...	EI 17	ENG
Uitenhage	33 46.6 S	25 23	Feb 25, 28	9.6	22 27.8 W	....	....	10.2, 11.6	.15108	13	....	ENG
			Feb 25, 28	14.8, 17.4	22 11.0 W	....	....	15.8, 17.0	.15092	13	....	ENG
			Feb 26, 28	....	....	10.6, 11.1	63 57.6 S	....	....	...	EI 13	ENG
			Feb 27, 28	....	....	11.2, 11.7	64 01.4 S	....	....	...	EI 13	ENG
Cape Town, E	33 56.0 S	18 29	Dec 7, 27	16.0, 16.5, 16.8	24 45.4 W	....	....	....	....	13	....	ENG
			Dec 8, 27	....	....	10.8, 11.2	62 29.8 S	....	....	...	EI 13	ENG
			Dec 8, 27	....	....	12.9 to 14.1 (4)	62 31.0 S	....	....	...	EI 13	ENG
			Dec 8, 27	15.6 to 17.1 (6)	24 43.1 W	....	....	....	....	26	....	JES
			Dec 9, 27	....	....	....	....	10.8	.15660	26	....	JES
			Dec 9, 27	....	....	....	....	13.5 to 16.1	.15641	26	....	JES
			Dec 10, 27	....	....	10.7 to 13.8 (6)	62 32.5 S	14.9	.15625	26	EI 26	JES
			Dec 17, 27	8.3 to 17.8 (dv)	24 43.4 W	....	....	8.3 to 17.8	.15639	26	....	JES
			Dec 19, 27	....	....	8.2 to 17.0 (dv)	62 33.9 S	....	....	...	EI 26	JES
			Dec 26, 27	....	....	....	....	10.3, 12.0	.15664	26	....	JES
			Jun 19, 34	....	....	13.7 to 15.0 (4)	63 15.4 S	9.5, 10.8	.14951	16	EI 16	RHM
			Jun 20, 34	8.9, 12.1	24 23.4 W	....	....	10.2, 11.3	.14950	16	....	RHM
			Jun 20, 34	13.7 to 14.9 (4)	24 21.9 W	....	....	....	....	16	....	RHM
			Jun 21, 34	....	....	8.4, 8.7	63 13.4 S	....	....	...	EI 16	RHM

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[d] Combined declination and oscillation method. [e] From oscillations only.

AFRICA

Union of South Africa--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Cape Town, F	33 56.0 S	18 29	Dec 7, '27	14.1 to 16.8 (6)	24 46.8 W	....	....	....	....	26	....	JES
			Dec 8, 27	....	....	10.8 to 14.1 (6)	62 30.6 S	....	....	...	EI 26	JES
			Dec 8, 27	15.6 to 17.1 (6)	24 44.3 W	....	....	....	....	13	....	ENG
			Dec 9, 27	....	....	....	....	10.8 to 16.1	.154641	13	....	ENG
			Dec 21, 27	....	....	....	....	11.0, 12.9	.15653	26	....	JES
			Dec 22, 27	....	....	....	....	9.8 to 15.2	.15665	26	....	JES
			Dec 26, 27	....	....	....	....	10.3, 12.0	.15666	13	....	ENG
			Dec 26, 27	13.5 to 14.4 (4)	24 42.3 W	....	....	....	....	26	....	JES
			Jun 23, 34	12.7 to 15.9 (4)	24 23.9 W	16.5, 16.7	63 13.0 S	13.8, 14.9	.14941	16	EI 16	RHM
Cape Town, A	33 56.2 S	18 29	Nov 29, 27	9.8	25 05.9 W	12.2, 12.6	62 17.4 S	10.2, 10.8	.15690	26	EI 26	JES
			Nov 29, 27	11.2, 11.4, 11.6	25 02.2 W	....	....	....	....	26	....	JES
Cape Town, C	33 56.2 S	18 29	Dec 1, 27	9.6, 11.0	24 51.0 W	13.7, 14.0	62 17.2 S	10.0, 10.6	.15695	26	EI 26	JES
Cape Town Obs'y Absolute Pier	33 57.3 S	18 28	Jun 8, 34	....	....	14.2, 15.2	63 15.8 S	10.2, 11.6	.14951	16	EI 16	RHM
			Jun 11, 34	13.8, 14.0	24 34.3 W	15.2, 15.5	63 14.9 S	10.6, 11.7	.14960	16	EI 16	RHM
			Jun 12, 34	11.4, 11.7	24 38.0 W	14.0, 14.4	63 14.8 S	9.7, 10.7	.14960	16	EI 16	RHM
			Jun 14, '34	....	....	15.0, 16.4	63 14.2 S	....	....	...	EI 16	RHM
			Jun 15, 34	....	....	9.4, 10.7	63 14.2 S	....	....	...	EI 17	BG
			Jun 15, 34	....	....	14.3, 15.3	63 16.8 S	....	....	...	EI 17	BG
			Jun 15, 34	....	....	10.1, 11.6	63 14.2 S	....	....	...	EI 16	RHM
			Jun 15, 34	....	....	14.8, 15.8	63 16.7 S	....	....	...	EI 16	RHM
Cape Town Obs'y Auxiliary	33 57.3 S	18 28	May 28, 34	16.5	24 33.2 W	....	....	....	....	16	....	RHM
			May 30, 34	10.9, 11.3	24 35.4 W	....	....	14.6, 16.1	.14948	16	....	RHM
			Jun 1, 34	....	....	13.9 to 15.7 (4)	63 16.0 S	....	....	...	EI 16	RHM
			Jun 4, 34	13.1 to 14.6 (4)	24 32.8 W	....	....	10.3, 11.6	.14964	...	....	RHM
			Jun 5, 34	14.0 to 15.4 (4)	24 33.5 W	....	....	....	....	16	....	RHM
			Jun 6, 34	....	....	14.4 to 15.7 (3)	63 17.4 S	9.9, 11.2	.14933	16	EI 16	RHM
			Jun 7, 34	11.0, 11.4	24 35.8 W	....	....	....	....	17	....	BG
			Jun 8, 34	....	....	14.2, 15.2	63 15.6 S	10.2, 11.5	.14940	17	EI 17	BG
			Jun 11, 34	13.7, 14.1	24 32.2 W	15.2, 15.6	63 16.3 S	10.6, 11.6	.14946	17	EI 17	BG
			Jun 12, 34	11.4, 11.7	24 36.2 W	14.1, 14.4	63 15.6 S	9.6, 10.7	.14956	17	EI 17	BG
			Jun 14, 34	....	....	14.3, 15.8	63 15.2 S	....	....	...	EI 16	RHM
			Jun 14, 34	....	....	15.1, 16.4	63 15.2 S	....	....	...	EI 17	BG
			Jun 15, 34	....	....	9.4, 10.7	63 14.6 S	....	....	...	EI 16	RHM
			Jun 15, 34	....	....	10.1, 11.6	63 15.0 S	....	....	...	EI 17	BG
			Jun 15, 34	....	....	14.2, 15.3	63 17.2 S	....	....	...	EI 16	RHM
			Jun 15, 34	....	....	14.8, 15.8	63 17.2 S	....	....	...	EI 17	BG
Mossel Bay	34 11 S	22 08	Mar 1, 28	14.7, 16.6	23 35.7 W	....	....	15.2, 16.4	.15272	13	....	ENG

AFRICA

Union of South Africa--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Buffel's Bay	34 19.2 S	18 28	Nov 6, '28	15.6, 17.8	24 35.4 W	....	....	16.1, 17.4	.15490	13	....	ENG
			Nov 7, 28	12.0, 16.2	24 36.5 W[h]	....	....	....	....	...	....	ENG
			Nov 7, 28	6.1 to 18.0 (dv)	24 37.4 W	....	....	6.1 to 18.0	.15484	13	....	ENG
			Nov 8, 28	....	....	6.8, 7.3	62 46.8 S	....	....	...	EI 13	ENG
			Nov 8, 28	....	....	9.1 to 15.1 (dv)	62 46.9 S	....	....	...	EI 13	ENG
			Feb 11, 30	6.4 to 18.1 (dv)	24 36.4 W	....	....	6.3 to 18.0	.15376	13	....	ENG
			Feb 12, 30	14.1, 18.3	24 35.8 W	11.8, 12.0	62 54.4 S	14.8, 17.8	.15350	13	EI 13	ENG
			Feb 13, 30	6.8 to 18.0 (dv)	24 34.8 W	....	....	6.8 to 18.0	.15308	13	....	ENG
			Feb 14, 30	14.3	24 32.8 W	....	....	14.5	.15309[e]	13	....	ENG

ASIA

Arabia

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Bahra	29 37 N	47 57	May 11, '37	....	....	13.7, 14.2	43 17.4 N	....	....	...	EI 171	M-W
			May 13, 37	10.4, 15.7	2 48.0 E	....	....	11.2, 15.0	.31256	21	....	M-W
Kuwait	29 21 N	47 58	May 17, 37	8.5, 10.4	2 42.2 E	16.6, 16.9	42 52.8 N	8.7, 9.8	.31430	21	EI 171	M-W
Gahlula	29 19 N	47 23	May 15, 37	....	....	14.9, 15.3	42 40.4 N	....	....	...	EI 171	M-W
			May 16, 37	9.4, 12.1	2 56.6 E	....	....	10.0, 11.5	.31387	21	....	M-W
Madaniyat	29 07 N	47 58	May 8, 37	11.0	2 41.9 E	....	....	....	....	21	....	M-W
			May 9, 37	8.8	2 46.3 E	....	....	....	....	21	....	M-W
			May 10, 37	10.8, 15.3	2 43.2 E	8.7, 9.2	42 26.8 N	11.7, 14.7	.31568	21	EI 171	M-W
Aden, C	12 49.5 N	45 01	May 2, 35	8.9, 10.8	0 39.7 E	8.2, 11.2	8 39.4 N	9.4, 10.3	.35848	18	EI 18	RHM
			May 2, 35	12.6, 14.1	0 37.4 E	14.6	8 41.4 N	12.9, 13.7	.35827	18	EI 18	RHM
			May 3, 35	....	....	6.4 to 17.8 (dv)	8 40.0 N	....	....	...	EI 18	RHM
			May 4, 35	6.2 to 17.9 (dv)	0 39.9 E	....	....	6.2 to 17.9	.35842	18	....	RHM
Aden, B	12 49.3 N	44 59	Apr 27, 35	13.0, 15.4	0 22.2 E	11.1	8 46.5 N	14.1, 15.0	.35820	18	EI 18	RHM

Baluchistan

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Nushki	29 32.9 N	65 59	Nov 25, '28	9.9, 11.4	1 37.4 E	12.2, 12.4	44 31.4 N	10.3, 11.0	.32181	25	EI 25	OD
Nok-Kundi	28 50.5 N	62 46	Nov 20, 28	12.4, 14.1	2 27.4 E	14.5, 14.7	43 14.4 N	12.9, 13.8	.32382	25	EI 25	OD

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[e] From oscillations only. [h] Short magnet used.

ASIA

China

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Kalgan, A	40 51.4 N	114 51	Aug 25, '32	10.4, 11.7	3 47.3 W	13.4, 13.6	58 40.7 N	10.8, 11.4	.28124	13	EI 13	FCB
			Aug 26, 32	6.4, 7.6	3 41.8 W	8.6, 8.8	58 41.2 N	6.7, 7.4	.28139	13	EI 13	FCB
Kalgan, B	40 49.0 N	114 51	Aug 25, 32	....	....	6.3, 6.6	58 47.2 N	....	....	...	EI 13	FCB
			Aug 26, 32	13.8, 15.2	4 15.6 W	....	....	14.2, 14.9	.27984	13	....	FCB
Tienchen	40 26.2 N	114 01	Aug 27, 32	....	....	15.5 to 16.0 (3)	58 10.8 N	12.4, 13.4	.28440	13	EI 13	FCB
Peiping, C	40 00.6 N	116 18	Aug 3, 32	15.8	4 55.2 W	13.3, 13.5	57 16.8 N	....	....	13	EI 13	CTK
			Aug 4, 32	7.0, 10.2	4 52.6 W	11.6, 11.8	57 18.7 N	7.7, 9.1	.28980	13	EI 13	CTK
Peiping, A	39 56.9 N	116 25	Aug 22, 32	13.9, 15.5	4 36.4 W	12.8, 13.3	57 22.0 N	14.3, 15.2	.28864	13	EI 13	FCB
			Aug 23, 32	6.5, 8.1	4 30.5 W	8.8, 9.2	57 24.2 N	7.0, 7.8	.28827	13	EI 13	FCB
Peiping, B	39 52.5 N	116 23	Sep 3, 32	15.3, 16.6	4 43.8 W	17.2, 17.4	57 13.6 N	15.6, 16.4	.28886	13	EI 13	FCB
			Sep 5, 32	6.5, 7.9	4 41.2 W	8.7, 8.9	57 13.4 N	6.8, 7.6	.28872	13	EI 13	FCB
Tinghsien (Tingchow)	38 30.6 N	115 05	Jul 30, 32	....	....	17.4, 17.6	55 49.1 N	....	....	...	EI 13	CTK
			Jul 31, 32	9.8	3 59.0 W	....	....	10.6	.29741	13	....	CTK
			Jul 31, 32	16.2	4 02.6 W	....	....	15.6	.29718	13	....	CTK
Shihkiachwang, A	38 02.7 N	114 30	Jul 28, 32	12.9, 17.7	3 47.2 W	13.2, 14.0	55 08.1 N	15.9, 17.2	.30044	13	EI 13	CTK
			Jul 29, 32	7.6, 10.4	3 44.3 W	6.8 to 11.0 (4)	55 14.3 N	8.3, 9.6	.30032	13	EI 13	CTK
			Sep 6, 32	10.2, 11.0	3 45.3 W	11.5, 11.7	55 12.9 N	10.6	.30031	13	EI 13	FCB
Shihkiachwang, B	38 02.7 N	114 30	Sep 6, 32	15.0, 16.4	3 43.8 W	17.3, 17.5	55 15.4 N	15.4, 16.1	.30020	13	EI 13	FCB
Taiyuanfu	37 51.9 N	112 33	Jul 25, 32	7.8, 15.5	3 15.1 W	14.9, 15.0	55 11.4 N	8.6, 10.9	.30132	13	EI 13	CTK
			Jul 26, 32	7.5, 10.4	3 14.6 W	6.5, 6.7	55 11.2 N	8.3, 9.9	.30122	13	EI 13	CTK
			Jul 26, 32	12.2, 14.8	3 20.7 W	11.6, 11.8	55 10.9 N	12.8, 14.3	.30148	13	EI 13	CTK
Changte, A	36 06.5 N	114 23	Jul 21, 32	7.0, 10.8	3 28.6 W	11.5, 11.7	52 34.6 N	7.7, 10.2	.31234	13	EI 13	CTK
Changte, B	36 06.4 N	114 21	Jul 22, 32	6.2, 8.9	3 31.9 W	9.6, 9.8	52 32.8 N	7.4, 8.2	.31239	13	EI 13	CTK
Shenchow, A	34 48.2 N	111 11	Jul 17, 32	8.5, 11.8	2 33.3 W	13.9, 14.2	50 54.7 N	9.4, 11.0	.32202	13	EI 13	CTK
Shenchow, B	34 47.6 N	111 11	Jul 16, 32	7.2, 11.4	2 34.2 W	15.3, 15.6	50 58.8 N	8.2, 10.8	.32217	13	EI 13	CTK
Chengchow, A	34 45.2 N	113 43	Jul 5, 32	13.8, 15.1, 16.7	3 02.9 W	11.3, 11.6	50 41.8 N	14.1, 14.8	.32114	13	EI 13	B-K
Chengchow, B	34 44.8 N	113 43	Jul 18, 32	....	....	18.1, 18.3	50 49.2 N	....	....	...	EI 13	CTK
			Jul 19, 32	7.4, 11.3	3 03.6 W	....	....	7.1 to 10.5	.32065	13	....	CTK
Sian, B	34 16.4 N	108 59	Jul 9, 32	9.7, 11.6	1 51.4 W	12.7 to 15.4 (4)	50 31.1 N	7.1 to 10.9	.32332	13	EI 13	B-K
Sian, A	34 16.3 N	108 56	Jul 8, 32	5.6 to 12.4 (4)	1 42.1 W	14.9 to 16.2 (4)	50 28.2 N	6.0 to 11.6	.32344	13	EI 13	B-K
Lukiapang, Observatory, Da	31 19.0 N	121 02	Nov 11, 31	15.7	3 35.7 W	....	....	16.2	.33341	13	....	FCB
			Nov 13, 31	8.8, 10.5, 10.9	3 34.1 W	....	....	9.3 to 11.3	.33376	13	....	FCB
			Nov 13, 31	12.4, 13.9, 15.4	3 35.3 W	....	....	12.0 to 15.0	.33372	13	....	FCB
Lukiapang Observatory, Db	31 19.0 N	121 02	Nov 14, 31	....	....	9.0 to 11.3 (6)	45 22.9 N	....	....	...	EI 13	FCB
Lukiapang Observatory, F	31 19.0 N	121 02	Nov 12, 31	8.8, 10.5, 10.9	3 35.1 W	....	....	9.3 to 12.0	.33331	13	....	FCB
			Nov 12, 31	12.4 to 16.7 (4)	3 35.5 W	....	....	15.0, 15.8	.33330	13	....	FCB

ASIA

China--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ʹ	° ʹ		h h h	° ʹ	h h	° ʹ	h h	c.g.s.			
Zosè Observatory, Smith Pier	31 05.8 N	121 11	Feb 7, '33	8.2 to 12.2 (4)	3 23.6 W	15.2 to 16.4 (6)	45 31.2 N	8.7 to 11.7	.33253	13	EI 13	FCB
			Feb 8, 33	8.2 to 12.2 (4)	3 23.8 W	....	....	8.7 to 11.6	.33246	13	....	FCB
			Feb 9, 33	....	....	....	....	14.6, 15.4	.33232	13	....	FCB
			Feb 10, 33	....	....	14.6 to 16.1 (6)	45 32.1 N	....	....	13	....	FCB
			Sep 11, 35	....	....	15.2 to 17.3 (4)	45 31.2 N	....	....	...	EI 13	FCB
			Sep 12, 35	....	....	8.8, 9.4	45 36.0 N	....	....	...	EI 13	FCB
			Sep 13, 35	15.2 to 17.3 (8)	3 24.3 W	....	....	8.0 to 11.8	.33248	13	....	FCB
			Jul 21, 36	17.2 to 18.0 (4)	3 24.2 W	....	....	....	....	13	....	FCB
			Jul 22, 36	11.6, 11.8	3 25.5 W	17.3 to 18.6 (7)	45 31.3 N	9.0 to 11.0	.33296	13	EI 13	FCB
			Jul 22, 36	....	....	....	....	14.3, 15.0	.33330	13	....	FCB
			Jul 23, 36	....	....	8.5 to 10.0 (4)	45 30.7 N	....	....	...	EI 13	FCB
Zosè Observatory, Pier NE	31 05.8 N	121 11	Feb 8, 33	14.2 to 17.0 (6)	3 24.9 W	....	....	14.6, 15.3	.33234	13	....	FCB
			Feb 9, 33	10.6	3 24.2 W	....	....	8.1 to 9.2	.33240	13	....	FCB
			Feb 10, 33	8.7 to 12.7 (4)	3 25.8 W	....	....	9.2 to 12.2	.33231	13	....	FCB
			Feb 11, 33	10.8, 12.5	3 25.8 W	....	....	11.3, 12.1	.33238	13	....	FCB
			Sep 10, 35	15.2 to 17.5 (4)	3 24.1 W	....	....	15.6, 16.4	.33278	13	....	FCB
			Sep 11, 35	11.4, 11.6, 11.9	3 26.5 W	....	....	8.6 to 10.8	.33281	13	....	FCB
			Sep 13, 35	17.9	3 24.4 W	....	....	....	....	13	....	FCB
			Jul 20, 36	13.8 to 17.8 (6)	3 26.6 W	....	....	14.3 to 16.9	.33286	13	....	FCB
			Jul 21, 36	7.9	3 20.2 W	....	....	8.3, 9.0	.33272	13	....	FCB
Zosè Observatory, Schulze Pier	31 05.8 N	121 11	Feb 11, 33	....	....	8.3 to 10.0 (7)	45 31.4 N	....	....	...	EI 13	FCB
			Sep 12, 35	....	....	10.2 to 12.0 (4)	45 35.5 N	....	....	...	EI 13	FCB
			Sep 12, 35	....	....	15.0 to 16.4 (3)	45 33.6 N	....	....	...	EI 13	FCB
Zosè Observatory, Brown Pier	31 05.8 N	121 11	Jul 21, 36	9.9 to 11.0 (5)	3 23.9 W	....	....	11.4, 12.0	.33326	13	....	FCB
			Jul 21, 36	16.6	3 27.2 W	....	....	14.2 to 16.2	.33313	13	....	FCB
Kweichowfu (Fengchieh), B	31 02.8 N	109 25	Jul 27, 33	17.2, 17.5	1 51.9 W	....	....	....	....	13	....	CTK
			Jul 28, 33	14.9, 15.2	1 54.5 W	10.4 to 11.3 (4)	45 39 N[j]	6.7, 8.2	.34330	13	EI 13	CTK
Kweichowfu (Fengchieh), A	31 01.0 N	109 22	Jul 29, 33	9.2, 11.7	1 53.4 W	14.0, 14.2	45 40 N[j]	9.9, 11.1	.34338	13	EI 13	CTK
			Jul 31, 33	11.0, 14.0	1 56.8 W	8.0 to 9.0 (4)	45 42 N[j]	11.8, 13.1	34364	13	EI 13	CTK

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[j] Approximate value because of change in adjustment of inclinometer.

ASIA

China--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Wanhsien, B	30 48.7 N	108 18	Jul 24, '33	14.4, 18.2	1 43.6 W	....	....	15.2, 17.6	.34377	13	....	CTK
			Jul 25, 33	9.6	1 39.7 W	7.6, 8.1	45 18 N[j]	10.4	.34432	13	EI 13	CTK
			Jul 25, 33	16.2	1 42.7 W	17.0, 17.4	45 18 N[j]	15.5	.34420	13	EI 13	CTK
			Jul 26, 33	10.1	1 41.5 W	....	....	10.8	.34473	13	....	CTK
			Jul 26, 33	17.3	1 42.8 W	....	....	16.7	.34442	13	....	CTK
Ichang, A	30 43.3 N	111 18	Aug 23, 33	10.0, 11.5	2 03.8 W	12.1, 12.3	45 07 N[j]	10.4, 11.2	.34292	13	EI 13	FCB
Ichang, B	30 42.9 N	111 18	Aug 12, 33	5.7, 7.2	2 00.6 W	17.1 to 17.9 (4)	45 11 N[j]	6.1, 6.9	.34264	13	EI 13	FCB
			Aug 19, 33	14.0, 15.4	2 03.6 W	16.2 to 16.8 (3)	45 13 N[j]	14.4, 15.1	.34244	13	EI 13	FCB
			Sep 19, 34	11.1, 13.7	2 06.2 W	10.4, 10.6	45 08.6 N	12.7, 13.4	.34328	13	EI 13	FCB
			Sep 19, 34	15.2, 16.4	2 04.4 W	14.2, 14.4	45 08.0 N	15.4, 16.1	.34308	13	EI 13	FCB
Ichang, C	30 42.5 N	111 21	Jul 3, 33	14.3, 16.8	2 05.6 W	9.9 to 10.7 (4)	45 08 N[j]	15.0, 16.3	.34312	13	EI 13	CTK
Chengtu, B	30 39.3 N	104 05	Sep 27, 34	8.9, 10.5	0 53.6 W	8.2, 8.4	45 09.0 N	9.3, 10.0	.34531	13	EI 13	FCB
			Sep 27, 34	14.5, 15.8	0 55.8 W	16.8, 17.0	45 09.6 N	14.8, 15.5	.34540	13	EI 13	FCB
			Sep 28, 34	6.4 to 17.6 (dv)	0 53.5 W	....	....	6.4 to 17.6	.34549	13	....	FCB
			Oct 1, 34	....	....	6.8 to 17.7 (dv)	45 07.6 N	....	....	...	EI 13	FCB
			Oct 2, 34	9.2, 9.4	0 53.8 W	....	....	....	....	13	....	FCB
Chengtu, A	30 38.0 N	104 03	Sep 29, 34	8.5, 10.1	0 55.8 W	10.9, 11.1	45 07.1 N	8.9, 9.8	.34548	13	EI 13	FCB
			Sep 30, 34	14.4, 15.7	0 56.4 W	16.5, 16.7	45 06.8 N	14.7, 15.4	.34561	13	EI 13	FCB
Hankow	30 37.0 N	114 18	Feb 16, 32	6.9 to 18.0 (dv)	2 20.4 W	....	....	6.9 to 18.0	.34231	13	....	FCB
			Feb 19, 32	15.0, 15.4, 16.7	2 19.6 W	17.4, 17.6	44 41.8 N	15.7, 16.4	.34242	13	EI 13	FCB
			Feb 20, 32	....	....	7.6 to 17.7 (dv)	44 41.0 N	....	....	...	EI 13	FCB
			Sep 14, 33	7.4, 8.9	2 18.6 W	9.4, 9.6	44 42 N[j]	7.8, 8.6	.34223	13	EI 13	FCB
			Sep 15, 33	8.4, 9.6	2 20.2 W	10.6, 10.8	44 42 N[j]	8.7, 9.4	.34262	13	EI 13	FCB
Wuchang	30 33.7 N	114 20	Nov 21, 31	10.5, 11.4	2 21.6 W	....	....	13.8, 14.9	.34252	13	....	FCB
			Dec 5, 31	....	....	14.3	44 36.4 N	....	....	...	EI 13	FCB
			Jan 2, 32	6.3 to 18.2 (dv)	2 21.4 W	....	....	....	....	13	....	B-K
			Jan 9, 32	....	....	16.9, 17.1	44 34.1 N	....	....	...	EI 13	FCB
			Feb 11, 32	....	....	15.9	44 32.5 N	....	....	...	EI 13	CTK
			Feb 13, 32	....	....	8.2 to 17.7 (dv)	44 36.2 N	....	....	...	EI 13	B-K
			Feb 26, 32	7.3 to 17.6 (dv)	2 23.1 W	....	....	7.3 to 17.6	.34264	13	....	CTK
			Mar 29, 32	....	....	....	....	13.5	.34318	13	....	CTK
			Oct 22, 32	11.0, 15.3	2 22.2 W	8.8, 16.8	44 35.8 N	11.8, 14.6	.34288	13	EI 13	CTK
			Nov 1, 32	6.4 to 17.3 (dv)	2 21.5 W	....	....	6.4 to 17.3	.34257	13	....	FCB
			Nov 5, 32	....	....	7.7 to 16.7 (dv)	44 34.0 N	....	....	...	EI 13	CTK
			Nov 14, 32	14.3, 15.9	2 21.0 W	16.7, 16.9	44 35.7 N	14.8, 15.6	.34256	13	EI 13	FCB
			Nov 19, 32	8.3 to 17.0 (dv)	2 21.3 W	....	....	8.7 to 17.0	.34283	13	....	CTK
			Dec 1, 32	....	....	7.8 to 17.0 (dv)	44 33.4 N	....	....	...	EI 13	FCB

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[j] Approximate value because of change in adjustment of inclinometer.

ASIA

China--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Wuchang--continued	30 33.7 N	114 20	Dec 8, '32	13.1, 14.8	2 22.2 W	15.6, 15.9	44 33.5 N	13.5, 14.3	.34288	13	EI 13	FCB
			Dec 17, 32	7.4 to 17.0 (dv)	2 19.6 W	....	....	7.7 to 17.0	.34231	13	....	CTK
			Dec 31, 32	14.4, 16.9	2 21.6 W	12.3, 12.6	44 37.0 N	14.4, 16.1	.34304	13	EI 13	CTK
			Jan 2, 33	....	....	7.7 to 16.7 (dv)	44 34.1 N	....	....	...	EI 13	CTK
			Jan 10, 33	13.0, 14.7	2 23.2 W	15.4, 15.6	44 33.9 N	13.4, 14.3	.34294	13	EI 13	FCB
			Jan 14, 33	7.0 to 17.3 (dv)	2 20.9 W	....	....	7.0 to 17.3	.34348	13	....	FCB
			Jan 21, 33	13.2, 14.7	2 22.4 W	15.4, 15.6	44 34.4 N	13.6, 14.4	.34293	13	EI 13	FCB
			Jan 27, 33	....	....	7.2 to 17.3 (dv)	44 34.2 N	....	....	...	EI 13	FCB
			Jan 31, 33	14.1, 17.1	2 22.8 W	12.0, 12.2	44 34.0 N	15.0, 16.5	.34286	13	EI 13	CTK
			Feb 25, 33	....	....	7.4 to 17.3 (dv)	44 34.4 N	....	....	...	EI 13	CTK
			Mar 4, 33	14.9	2 23.6 W	13.6, 13.9	44 32.0 N	16.1	.34318	13	EI 13	CTK
			Mar 11, 33	6.4 to 18.0 (dv)	2 21.2 W	....	....	6.4 to 18.0	.34308	13	....	FCB
			Mar 18, 33	14.4, 17.0	2 23.4 W	13.3, 13.4	44 32.2 N	15.3, 16.5	.34310	13	EI 13	CTK
			Apr 4, 33	13.8, 15.3	2 23.6 W	16.3, 16.5	44 33.9 N	14.2, 15.0	.34304	13	EI 13	FCB
			Apr 15, 33	....	....	7.2 to 17.3 (dv)	44 36 N[j]	....	....	...	EI 13	CTK
			Apr 22, 33	9.9, 16.6	2 22.1 W	17.3, 17.5	44 36 N[j]	12.6, 15.9	.34250	13	EI 13	CTK
			Apr 29, 33	13.7, 15.2	2 23.7 W	15.6 to 16.4 (3)	44 35 N[j]	14.0, 14.8	.34302	13	EI 13	FCB
			May 6, 33	5.9 to 18.0 (dv)	2 22.5 W	....	....	5.9 to 18.0	.34270	13	....	FCB
			May 13, 33	14.2, 15.6, 15.8	2 23.7 W	16.6, 17.1	44 35 N[j]	14.5, 15.3	.34308	13	EI 13	FCB
			May 20, 33	....	....	6.7 to 18.0 (dv)	44 38 N[j]	....	....	...	EI 13	CTK
			May 30, 33	16.2, 16.5	2 22.8 W	13.9 to 15.3 (6)	44 34 N[j]	17.2	.34232	13	EI 13	CTK
			Jun 5, 33	6.0 to 18.0 (dv)	2 21.8 W	....	....	6.0 to 18.0	.34278	13	....	FCB
			Jun 10, 33	14.5, 15.9	2 23.2 W	16.9, 17.2	44 34 N[j]	14.8, 15.6	.34301	13	EI 13	FCB
			Jun 17, 33	....	....	6.1 to 18.0 (dv)	44 33 N[j]	....	....	...	EI 13	FCB
			Oct 7, 33	14.0, 15.4	2 22.6 W	16.2, 16.6	44 33 N[j]	14.3, 15.1	.34290	13	EI 13	FCB
			Oct 21, 33	6.2 to 17.3 (dv)	2 22.8 W	....	....	6.2 to 17.3	.34315	13	....	FCB
			Oct 28, 33	13.8, 17.4	2 23.5 W	....	....	15.0, 16.5	.34310	13	....	CTK
			Nov 4, 33	....	....	7.9 to 17.0 (dv)	44 34 N[j]	....	....	...	EI 13	CTK
			Nov 11, 33	13.8, 15.2, 15.5	2 21.9 W	16.4, 16.8	44 35 N[j]	14.2, 14.9	.34316	13	EI 13	ECB
			Nov 18, 33	6.5 to 17.3 (dv)	2 21.3 W	....	....	6.5 to 17.3	.34320	13	....	FCB
			Dec 2, 33	10.1, 15.1	2 21.6 W	16.5, 17.0	44 34 N[j]	11.4, 14.6	.34332	13	EI 13	CTK
			Dec 9, 33	11.5, 14.5	2 22.0 W	10.0, 10.5	44 33 N[j]	12.6, 14.0	.34300	13	EI 13	CTK
			Jan 2, 34	....	....	7.4 to 17.3 (dv)	44 32 N[j]	....	....	...	EI 13	FCB
			Jan 27, 34	14.1, 15.6	2 23.2 W	16.6 to 17.2 (3)	44 33 N[j]	14.6, 15.4	.34290	13	EI 13	FCB

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[j] Approximate value because of change in adjustment of inclinometer.

ASIA

China--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Wuchang--continued	30 33.7 N	114 20	Feb 8, '34	7.8 to 17.7 (dv)	2 21.1 W	....	....	7.8 to 17.7	.34313	13	....	CTK
			Mar 10, 34	11.6 to 15.7 (4)	2 22.6 W	8.4, 16.6	44 34 N[j]	9.5 to 14.8	.34316	13	EI 13	CTK
			Mar 22, 34	16.9	2 22.3 W	....	....	17.2	.34300	13	....	FCB
			Apr 21, 34	8.7 to 14.7 (4)	2 22.2 W	8.0 to 15.5 (3)	44 33 N[j]	9.3 to 14.0	.34323	13	EI 13	FCB
			May 19, 34	8.7 to 14.7 (4)	2 24.2 W	7.9 to 15.7 (6)	44 35 N[j]	9.4 to 14.0	.34300	13	EI 13	FCB
			Jun 26, 34	8.9 to 14.8 (4)	2 22.3 W	7.8 to 16.2 (8)	44 32 N[j]	9.6 to 14.2	.34332	13	EI 13	CTK
			Jul 25, 34	8.9 to 15.0 (4)	2 23.2 W	8.0 to 15.9 (6)	44 32 N[j]	9.6 to 14.6	.34344	13	EI 13	CTK
			Aug 23, 34	8.7 to 14.7 (4)	2 23.8 W	7.8 to 15.7 (6)	44 33 N[j]	9.3 to 14.0	.34343	13	EI 13	FCB
			Aug 30, 34	....	....	16.0, 16.2	44 36 N[j]	....	....	...	EI 13	B-K
			Sep 8, 34	....	....	10.9 to 15.3 (5)	44 32.7 N	....	....	...	EI 13	B-K
			Sep 12, 34	8.7 to 14.7 (4)	2 23.8 W	7.9 to 15.7 (6)	44 33.5 N	9.3 to 14.0	.34312	13	EI 13	FCB
			Dec 11, 34	9.0 to 14.7 (4)	2 22.2 W	8.3 to 15.8 (8)	44 33.1 N	9.4 to 14.0	.34333	13	EI 13	FCB
			Dec 15, 34	....	....	14.6 to 15.7 (4)	44 32.2 N	....	....	...	EI 13	CTK
			Jan 23, 35	12.8, 15.2	2 23.8 W	11.2 to 15.7 (4)	44 32.7 N	13.5, 14.8	.34316	13	EI 13	CTK
			Jan 24, 35	8.7, 12.6	2 23.4 W	7.9, 8.1	44 33.6 N	9.3, 11.3	.34323	13	EI 13	CTK
			Jan 26, 35	8.7, 10.8	2 21.5 W	....	....	9.2, 10.4	.34342	13	....	CTK
			Mar 2, 35	8.7 to 14.7 (4)	2 22.0 W	7.9 to 15.3 (6)	44 32.1 N	9.3 to 14.0	.34340	13	EI 13	FCB
			Mar 23, 35	8.7 to 15.0 (4)	2 22.1 W	8.0 to 15.6 (6)	44 32.7 N	9.6 to 14.5	.34354	13	EI 13	CTK
			Apr 22, 35	8.7 to 14.7 (4)	2 23.5 W	7.9 to 15.6 (6)	44 32.8 N	9.2 to 14.1	.34342	13	EI 13	FCB
			May 30, 35	8.7 to 14.7 (4)	2 23.2 W	11.1 to 15.9 (8)	44 33.6 N	9.2 to 14.1	.34366	13	EI 13	FCB
			Jul 4, 35	8.7, 11.7	2 19.8 W	14.4 to 15.0 (4)	44 32.5 N	9.7, 11.0	.34392	13	EI 13	CTK
			Sep 5, 35	8.8 to 14.6 (4)	2 22.9 W	7.8 to 15.6 (8)	44 32.8 N	9.3 to 14.1	.34362	13	EI 13	FCB
			Oct 5, 35	8.9 to 14.7 (4)	2 22.3 W	7.8 to 15.6 (6)	44 33.1 N	9.4 to 14.1	.34358	13	EI 13	FCB
			Mar 17, 36	8.7 to 14.7 (4)	2 21.5 W	7.9 to 15.6 (6)	44 32.5 N	9.4 to 14.0	.34370	13	EI 13	FCB
			Apr 17, 36	8.7 to 14.7 (4)	2 22.1 W	7.9 to 15.6 (6)	44 33.1 N	9.4 to 14.0	.34374	13	EI 13	FCB

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[j] Approximate value because of change in adjustment of inclinometer.

ASIA

China--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Wuchang--concluded	30 33.7 N	114 20	May 15, '36	8.7 to 14.6 (4)	2 21.6 W	7.9 to 15.6 (6)	44 33.0 N	9.4 to 14.0	.34368	13	EI 13	FCB
			Jun 18, 36	8.7 to 14.7 (4)	2 22.6 W	7.9 to 15.6 (6)	44 31.3 N	9.3 to 14.0	.34394	13	EI 13	FCB
			Jul 11, 36	8.7 to 14.7 (4)	2 21.9 W	7.8 to 15.6 (6)	44 33.8 N	9.3 to 14.0	.34354	13	EI 13	FCB
Shasi, A	30 18.1 N	112 15	Aug 24, 33	14.5, 15.8	2 10.6 W	16.8, 17.0	44 23.7 N	14.8, 15.6	.34514	13	EI 13	FCB
Shasi, B	30 18.1 N	112 15	Aug 25, 33	6.8, 8.2	2 06.6 W	11.0, 11.4	44 22.8 N	7.2, 8.0	.34446	13	EI 13	FCB
			Aug 25, 33	14.4, 15.9	2 10.9 W	16.9, 17.1	44 24.4 N	14.7, 15.5	.34464	13	EI 13	FCB
Kangting, A	30 04.1 N	101 55	Oct 18, 34	9.7, 11.3	0 48.6 W	15.1, 15.2	44 05.0 N	10.2, 11.0	.34858	13	EI 13	FCB
			Oct 19, 34	6.3 to 17.5 (dv)	0 49.2 W	....	....	6.3 to 17.5	.34870	13	....	FCB
			Oct 20, 34	....	....	6.8 to 16.6 (dv)	44 04.7 N	....	....	...	EI 13	FCB
Kangting, B	30 03.5 N	101 55	Oct 22, 34	9.6, 9.8, 11.4	0 51.8 W	12.6 to 13.5 (4)	44 03.0 N	10.2, 11.1	.34878	13	EI 13	FCB
Yinkwanchai	30 02.7 N	101 31	Oct 25, 34	16.5, 17.5	0 52.3 W	....	....	16.9	.34894	13	....	FCB
			Oct 26, 34	7.1, 9.1	0 51.7 W	10.5, 10.7	44 06.8 N	7.4, 8.6	.34882	13	EI 13	FCB
Yaan (Yachowfu)	29 58.8 N	102 56	Oct 8, 34	10.6 to 16.3 (4)	0 56.6 W	14.7, 14.9	44 07.2 N	11.0 to 15.7	.35032	13	EI 13	FCB
Luting	29 57 N	102 12	Oct 16, 34	....	....	8.0, 8.2	43 54.4 N	6.6	.35269	13	EI 13	FCB
Fowchow	29 42.5 N	107 24	Jul 15, 33	16.9	1 17.8 W	....	....	17.8	.35174	13	....	CTK
			Jul 17, 33	10.7, 14.5, 17.3	1 19.1 W	8.2 to 9.0 (4)	43 22.8 N	11.3 to 16.6	.35254	13	EI 13	CTK
Hwangnipu	29 41 N	102 42	Oct 10, 34	....	....	....	....	16.0	.35145	13	....	FCB
Mosimien	29 40.5 N	102 08	Oct 31, 34	6.5, 7.9	0 48.2 W	9.5, 9.7	43 26.4 N	6.8, 7.6	.35306	13	EI 13	FCB
Nitow	29 40 N	102 24	Oct 13, 34	....	....	8.0 to 15.2 (6)	43 33.3 N	9.2 to 15.8	.35209	13	EI 13	FCB
Chungking, B (Pahsien, A)	29 34.6 N	106 37	Jul 10, 33	14.8	1 20.7 W	8.2 to 11.3 (6)	43 14.6 N	15.6, 16.0	.35200	13	EI 13	CTK
			Jul 11, 33	....	....	6.3 to 18.0 (dv)	43 14 N[j]	....	....	...	EI 13	CTK
			Jul 12, 33	8.6 to 17.5 (4)	1 17.9 W	....	....	9.4 to 17.0	.35195	13	....	CTK
			Jul 13, 33	7.2 to 18.0 (dv)	1 16.0 W	....	....	7.7 to 18.0	.35186	13	....	CTK
			Nov 20, 34	13.5, 15.0	1 18.0 W	15.7 to 16.1 (3)	43 13.2 N	13.9, 14.7	.35254	13	EI 13	FCB
Pahsien, B	29 33.6 N	106 35	Nov 21, 34	....	....	12.2 to 14.0 (4)	43 12.3 N	10.6, 11.3	.35246	13	EI 13	FCB
Omei	29 34 N	103 29	Nov 12, 34	....	....	16.5, 16.7	43 29.2 N	15.1, 15.8	.35302	13	EI 13	FCB
Loshan, A (Kiatingfu)	29 33.3 N	103 41	Nov 13, 34	15.7	1 09.3 W	....	....	16.0	.35388	13	....	FCB
			Nov 14, 34	8.4, 11.5	1 08.6 W	6.6 to 12.5 (4)	43 17.0 N	8.7, 11.3	.35394	13	EI 13	FCB
Loshan, B	29 33.3 N	103 41	Nov 14, 34	....	....	15.8, 16.0	43 17.8 N	14.4, 15.1	.35380	13	EI 13	FCB
Yochow	29 27.1 N	113 12	Aug 31, 33	6.7 to 12.5 (4)	1 58.8 W	10.4, 15.2	42 51.8 N	7.1 to 12.2	.34950	13	EI 13	FCB
Tawei	29 23 N	103 20	Nov 11, 34	....	....	9.8, 10.0	42 57.6 N	8.4, 9.0	.35402	13	EI 13	FCB

[j] Approximate value because of change in adjustment of inclinometer.

ASIA

China--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Fulin	29 21 N	102 46	Nov 6, '34	....	....	14.1, 14.4	42 47.4 N	12.5, 13.2	.35511	13	EI 13	FCB
Tzetati	29 17.3 N	102 15	Nov 3, 34	9.3, 10.6	0 39.6 W	11.2, 11.4	42 43.7 N	9.6, 10.3	.35556	13	EI 13	FCB
Ipin, B (Suifu)	28 47 N	104 39	Nov 17, 34	....	....	17.0, 17.3	41 53.4 N	15.1, 15.8	.35716	13	EI 13	FCB
Ipin, A (Suifu)	28 46.0 N	104 38	Nov 16, 34	14.3, 15.5	1 07.0 W	16.4, 16.6	41 47.6 N	14.6, 15.2	.35732	13	EI 13	FCB
			Nov 17, 34	9.9, 11.2	1 06.4 W	11.6, 11.8	41 46.8 N	10.2, 10.8	.35738	13	EI 13	FCB
Changsha, B	28 13.3 N	112 58	Apr 6, 32	10.7, 11.0	1 42.4 W	15.2, 17.1	40 50.6 N	11.3, 16.2	.35418	13	EI 13	B-K
			Apr 8, 32	....	....	6.4 to 18.2 (dv)	40 53.9 N	....	....	...	EI 13	B-K
			Apr 9, 32	5.9 to 18.0 (dv)	1 42.8 W	....	....	5.9 to 18.0	.35405	13	....	FCB
Changsha, C	28 13.3 N	112 58	Apr 10, 32	....	....	....	....	15.3, 16.2	.35418	13	....	FCB
			Apr 11, 32	....	....	6.4, 6.8	40 56.0 N	....	....	...	EI 13	FCB
Changsha, A	28 12.8 N	112 58	Apr 7, 32	10.1 to 16.9 (4)	1 46.4 W	12.3 to 14.8 (4)	40 55.7 N	10.5, 11.2	.35420	13	EI 13	B-K
Hengchow	26 55.2 N	112 35	Jul 8, 35	10.0, 15.6	1 30.5 W	8.6 to 9.1 (4)	38 40.0 N	13.6, 14.9	.36138	13	EI 13	CTK
			Jul 9, 35	6.7 to 18.2 (dv)	1 26.8 W	....	....	7.2 to 17.7	.36122	13	....	CTK
			Jul 10, 35	....	....	6.4 to 18.0 (dv)	38 41.8 N	....	....	...	EI 13	CTK
Kweilin	25 17.7 N	110 16	Aug 2, 35	11.7, 14.9	1 04.5 W	10.6 to 15.9 (4)	35 43.6 N	13.1, 14.3	.37019	13	EI 13	CTK
			Aug 3, 35	8.9, 14.4	1 02.0 W	11.2, 11.4	35 41.1 N	9.6, 13.7	.37014	13	EI 13	CTK
Shiuchow	24 47.4 N	113 35	Jul 13, 35	10.4, 15.8	1 11.6 W	8.3, 8.7	34 53.8 N	12.6, 15.0	.36863	13	EI 13	CTK
			Jul 15, 35	7.7 to 16.7 (4)	1 08.9 W	11.2 to 7.3 (6)	34 53.3 N	8.2 to 15.6	.36863	13	EI 13	CTK
Wuchow	23 28.4 N	111 16	Jul 22, 35	15.7	0 50.0 W	....	....	16.6	.37545	13	....	CTK
			Jul 23, 35	9.4, 13.2, 15.6	0 49.1 W	7.6, 7.8	32 26.2 N	10.6 to 15.1	.37625	13	EI 13	CTK
			Jul 24, 35	11.4, 14.0	0 49.0 W	8.9 to 15.2 (6)	32 25.4 N	12.1, 13.3	.37624	13	EI 13	CTK
Canton	23 06.3 N	113 18	Jul 17, 35	10.5, 15.2	0 44.4 W	7.7, 7.9	31 43.6 N	12.3, 14.5	.37554	13	EI 13	CTK
			Jul 18, 35	6.7 to 18.0 (dv)	0 45.9 W	....	....	7.2 to 18.0	.37570	13	....	CTK
			Jul 19,. 35	....	....	6.5 to 18.0 (dv)	31 42.5 N	....	....	...	EI 13	CTK
Nanning	22 50.2 N	108 20	Jul 28, 35	9.8. 15.1	0 37.2 W	13.1, 13.4	31 03.9 N	10.9, 14.5	.38030	13	EI 13	CTK
			Jul 29, 35	6.5 to 18.0 (dv)	0 36.9 W	....	....	7.1 to 18.0	.38039	13	....	CTK
			Jul 30, 35	....	....	7.0 to 18.0 (dv)	31 03.4 N	....	....	...	EI 13	CTK

India

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
Lahore,	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
45 km. east of	31 37.1 N	74 34	Dec 6, '28	9.3, 11.1	1 49.8 E	11.5, 11.6	47 40.8 N	9.9, 10.7	.31853	25	EI 25	OD
Channu	30 29.0 N	72 14	Dec 3, 28	9.1, 10.8	1 55.5 E	11.2, 11.3	45 51.5 N	9.6, 10.4	.32357	25	EI 25	OD
Delhi	28 41.1 N	77 14	Dec 11, 28	15.7, 16.0	0 58.6 E	....	....	....	....	25	....	OD
			Dec 12, 28	....	....	10.9, 11.0	43 02.6 N	9.5, 10.3	.33767	25	EI 25	OD
Benares	25 19.1 N	82 59	Dec 17, 28	8.8, 10.3	0 08.6 W	10.8, 10.9	37 21.0 N	9.2, 10.0	.36106	25	EI 25	OD

ASIA

Indo-China

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Hanoi	21 01.7 N	105 48	Apr 26 '38	10.0 to 14.5 (4)	0 25.2 W	9.5 to 14.8 (4)	27 10.2 N	10.3 to 14.3	.38889	28	EI 28	WCP
Vinh	18 40.3 N	105 40	Apr 29 38	9.6 to 15.0 (4)	0 08.2 W	9.3 to 15.2 (4)	22 08.7 N	9.9 to 14.8	.39570	28	EI 28	WCP
Huè	16 27.8 N	107 32	Apr 20, 38	9.9 to 15.2 (4)	0 19.4 E	9.5 to 15.5 (4)	17 25.8 N	10.2 to 14.9	.39854	28	EI 28	WCP
Siemreap (Angkor)	13 21.9 N	103 52	Apr 4, 38	9.6 to 15.7 (4)	0 17.6 E	9.1 to 16.0 (4)	9 52.4 N	9.8 to 15.5	.40477	28	EI 28	WCP
Pnompenh	11 34.3 N	104 55	Apr 9, 38	9.2 to 15.4 (4)	0 27.4 E	8.9 to 15.6 (4)	5 51.9 N	9.5 to 15.2	.40685	28	EI 28	WCP

Iraq

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Kizil (Quizil) Robat	34 10.5 N	45 08	Sep 28, '28	8.2, 10.2	3 13.0 E	10.7, 10.8	49 00.2 N	8.9, 9.8	.28648	25	EI 25	OD
Bagdad	33 19.6 N	44 27	May 25, 37	....	....	16.9, 17.3	48 23.6 N	....	....	...	EI 171	M-W
			May 26, 37	8.1, 10.2	3 07.0 E	....	....	8.7, 9.7	.29146	21	....	M-W
Bagdad, 20 km southeast of	33 16.2 N	44 32	Sep 7, 28	....	....	10.6, 10.8	47 39.9 N	8.3. 9.4	.29010	25	EI 25	OD
Babylon	32 33 N	44 26	Sep 23, 28	8.3	2 43.7 E	....	....	....	....	25	....	OD
Basra	30 32.2 N	47 49	May 22, 37	....	....	17.3, 17.6	44 41.8 N	....	....	...	EI 171	M-W
			May 23, 37	8.4, 11.2	2 57.6 E	....	....	9.2, 10.5	.30764	21	....	M-W

Japan

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Kakioka Obs'y, Pier 1	36 14 N	140 11	Jun 13, '29	15.2 to 18.1 (4)	5 43.5 W	....	....	15.6 to 17.8	.29729	24	....	C VII
			Jun 14, 29	5.9 to 12.7 (8)	5 41.3 W	14.5 to 16.0 (6)	49 25.7 N	6.2 to 12.4	.29720	24	EI 24	C VII
			Jun 14, 29	....	....	16.4 to 17.1 (6)	49 26.3 N	....	....	...	EI 24	C VII

Malaya

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Alor Star	6 12.3 N	100 24	Mar 19, '38	9.8 to 15.5 (4)	0 01.1 W	9.5 to 15.8 (4)	7 11.9 S	10.6 to 15.3	.40435	28	EI 28	WCP
Penang	5 25.0 N	100 19	Mar 16, 38	9.8 to 14.9 (4)	0 03.5 W	9.2 to 11.8 (3)	8 59.7 S	10.1 to 14.7	.40259	28	EI 28	WCP
Ipoh	4 35.4 N	101 04	Mar 13, 38	9.4 to 12.7 (3)	0 06.1 E	8.9 to 12.4 (4)	10 55.2 S	9.7 to 14.1	.40108	28	EI 28	WCP
Kuala Lumpur	3 08.8 N	101 44	Mar 11, 38	10.0 to 14.5 (4)	0 19.1 E	9.3 to 14.7 (4)	14 09.8 S	10.2 to 14.2	.39829	28	EI 28	WCP
Malacca	2 11.4 N	102 17	Mar 8, 38	10.3 to 14.1 (4)	0 26.4 E	9.4 to 14.4 (4)	16 14.0 S	10.6 to 13.8	.39573	28	EI 28	WCP
Singapore	1 18.4 N	103 52	Mar 4, 38	9.7, 10.9	0 48.4 E	9.4 to 14.0 (3)	17 56.3 S	10.0, 10.6	.39384	28	EI 28	WCP

ASIA

Persia (Iran)

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Damghan	36 11.2 N	54 18	Oct 31, '28	8.5, 10.6	4 31.2 E	11.1, 11.3	52 37.9 N	9.2, 10.2	.27888	25	EI 25	OD
Sabzawar, 54 km. east of	36 09.6 N	58 08	Nov 3, 28	8.5, 10.6	4 20.6 E	11.2, 11.3	53 03.4 N	9.2, 10.2	.27980	25	EI 25	OD
Sharifabad, 65 km. south of	35 50.2 N	59 23	Nov 8, 28	8.8, 10.9	4 10.6 E	11.4, 11.6	52 32.8 N	9.5, 10.5	.28191	25	EI 25	OD
Teheran	35 43.1 N	51 25	Oct 26, 28	8.7, 10.7	4 09.4 E	11.2, 11.4	51 43.2 N	9.3, 10.2	.27880	25	EI 25	OD
Shusp, 14 km south of	31 40.3 N	60 08	Nov 13, 28	9.3, 11.1	3 51.0 E	12.0, 12.2	47 04.8 N	9.9, 10.7	.30635	25	EI 25	OD
Khunak, 80 km south of	30 58.6 N	60 35	Nov 14, 28	8.7, 10.6	3 16.6 E	11.1, 11.3	46 10.9 N	9.3, 10.2	.30998	25	EI 25	OD
Duzdap	29 29.1 N	60 54	Nov 17, 28	13.4, 13.7	2 55.9 E	15.7, 15.8	43 59.4 N	14.4, 14.7	.31852[k]	25	EI 25	OD

Syria

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Jerablus	36 48.9 N	38 06	Jul 30, '28	8.5, 11.8	2 13.0 E	12.4, 12.7	51 42.4 N	11.2	.27067	25	EI 25	OD
Aleppo	36 13.3 N	37 07	Jul 23, 28	....	....	16.9, 17.4	51 01.2 N	....	....	...	EI 25	OD
Meskene	36 01.7 N	38 11	Aug 5, 28	7.9, 10.5	2 01.4 E	11.1, 11.3	50 50.6 N	8.8, 10.0	.27372	25	EI 25	OD
Rakka	35 56.4 N	39 02	Aug 13, 28	8.1, 10.5	2 16.6 E	11.2, 11.4	50 42.0 N	8.8, 9.9	.27500	25	EI 25	OD
Abu Kemal	34 27.3 N	40 53	Aug 30, 28	8.6, 10.8	2 22.0 E	11.4, 11.6	48 56.7 N	9.3, 10.3	.28296	25	EI 25	OD

Thailand (Siam)

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Bangkok	13 44.6 N	100 31	Mar 30, '38	9.8 to 15.4 (4)	0 56.8 W	9.4 to 15.6 (4)	9 07.9 N	10.1 to 16.2	.40472	28	EI 28	WCP
Aranya Pradesa	13 41.9 N	102 30	Apr 2, 38	9.4, 10.6, 11.3	0 00.8 W	9.1, 11.5	10 38.4 N	9.8, 10.4	.40656	28	EI 28	WCP
Hua Hin	12 33.8 N	99 58	Mar 27, 38	10.8 to 15.1 (4)	0 18.9 W	10.5 to 15.4 (3)	7 56.5 N	11.1 to 14.9	.40701	28	EI 28	WCP
Chumphon	10 30.7 N	99 11	Mar 25, 38	10.0 to 14.9 (4)	0 23.3 W	9.4 to 15.2 (4)	2 52.4 N	10.3 to 14.7	.40761	28	EI 28	WCP
Tung Song	8 10.1 N	99 41	Mar 23, 38	9.6, 10.8, 13.5	0 13.4 W	9.3 to 13.2 (3)	2 34.0 S	9.9 to 13.8	.40635	28	EI 28	WCP

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[k] Magnetic disturbance in progress.

AUSTRALASIA

Australia

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Darwin	12 26.8 S	130 50	Dec 16, '44	10.8, 11.6	3 46.9 E	12.1, 14.1	38 35.4 S	12.6, 13.2	.36112	18	EI 18	LAR
			Dec 16, 44	12.3, 13.5	3 48.8 E	....	....	....	....	18	....	LAR
Daly Waters	16 19.8 S	133 25	Oct 15, 37	10.2, 11.9	4 12.7 E	14.5	44 19.1 S	10.6, 11.5	.34842	18	EI 18	LAR
Redbank	17 10.9 S	137 45	Jun 29, 40	9.0, 10.5	4 48.0 E	8.4, 8.6	45 06.6 S	9.4, 10.1	.34376	18	EI 18	LAR
Newcastle Waters	17 23.0 S	133 26	Oct 16, 37	13.9, 15.4	4 15.0 E	11.4	46 16.2 S	14.3, 15.0	.33949	18	EI 18	LAR
Broome	17 58.3 S	122 13	Sep 4, 44	10.1, 11.2	2 39.6 E	9.7, 11.6	48 29.3 S	10.4, 10.9	.33194	18	EI 18	R-C
			Sep 4, 44	14.3, 15.3	2 45.0 E	14.0, 15.6	48 27.9 S	14.6, 15.1	.33195	18	EI 18	R-C
Croydon	18 13.1 S	142 14	Dec 1, 38	7.4, 9.1	5 33.4 E	6.4, 6.7	46 02.2 S	7.8, 8.7	.34162	18	EI 18	LAR
			Aug 3, 40	9.2, 10.7	5 36.6 E	8.3	46 03.2 S	9.6, 10.3	.34140	18	EI 18	LAR
Rockhampton Downs	18 56.9 S	135 11	Sep 15, 39	9.8, 11.1	4 20.3 E	8.0, 8.3	47 56.0 S	10.2, 10.8	.33520	18	EI 18	LAR
Townsville	19 14.5 S	146 46	Sep 24, 36	7.8, 9.2	6 38.2 E	7.5, 9.6	47 06.0 S	8.2, 9.0	.33756	28	EI 28	WCP
Tennant's Creek	19 33.4 S	134 14	Jul 15, 36	....	....	12.0, 12.5	48 52.9 S	....	....	...	EI 18	LAR
			Jul 16, 36	10.3, 12.4	4 18.8 E	....	....	10.8, 12.0	.33168	18	....	LAR
			Sep 18, 39	12.2, 13.7	4 28.4 E	10.7, 11.0	48 53.4 S	12.6, 13.4	.33143	18	EI 18	LAR
			Oct 21, 40	7.5, 8.9	4 23.1 E	6.6	48 50.7 S	7.9, 8.6	.33202	18	EI 18	LAR
Camooweal	19 55.1 S	138 06	Apr 23, 36	10.8, 13.3	4 39.0 E	14.3	49 10.7 S	11.4, 12.7	.33296	18	EI 18	LAR
			Sep 11, 39	14.6, 16.0	4 44.5 E	....	....	14.9, 15.6	.33294	18	EI 18	LAR
			Sep 12, 39	9.4, 10.9	4 40.2 E	8.0, 8.3	49 06.2 S	9.8, 10.6	.33308	18	EI 18	LAR
Lolworth Goldfield	20 06.5 S	145 19	Dec 8, 40	7.9, 9.5	6 20.0 E	7.2	48 23.1 S	8.4, 9.2	.33270	18	EI 18	LAR
Port Hedland	20 18.9 S	118 36	Feb 15, 38	14.6, 15.9	1 21.0 E	14.3, 16.2	52 24.2 S	15.0, 15.6	.31427	28	EI 28	WCP
Port Hedland	20 18.8 S	118 34	Aug 31, 44	10.0, 11.1	1 30.3 E	9.7, 11.4	52 21.5 S	10.3, 10.8	.31557	18	EI 18	R-C
			Aug 31, 44	13.5, 14.6	1 34.2 E	13.3, 14.8	52 19.9 S	13.8, 14.3	.31573	18	EI 18	R-C
The Granites	20 32.7 S	130 20	Nov 12, 39	10.0, 11.7	3 31.4 E	....	....	10.5, 11.3	.32575	18	....	LAR
			Nov 14, 39	....	....	6.4, 6.6	50 55.2 S	....	....	...	EI 18	LAR
Thomson's Rockhole	20 37.5 S	131 00	Dec 3, 39	9.6, 11.2	3 26.2 E	9.2	50 52.4 S	10.1, 10.8	.32548	18	EI 18	LAR
Cloncurry, A	20 42.4 S	140 31	Apr 18, 36	10.0, 12.3	4 56.1 E	15.3, 15.7	49 58.7 S	10.6, 11.7	.33321	18	EI 18	LAR
			Apr 9, 37	10.2, 12.2	4 56.3 E	15.6, 15.8	49 53.0 S	10.8, 11.8	.33414	18	EI 18	LAR
			Sep 8, 39	9.6, 11.1	4 55.1 E	11.9	49 54.8 S	10.0, 10.7	.33322	18	EI 18	LAR
Granites Road, No. 1	21 07.5 S	131 23	Dec 4, 39	10.0, 11.4	3 42.8 E	8.5	51 42.6 S	10.4, 11.1	.31950	18	EI 18	LAR
Taylor's Crossing	21 14.6 S	134 06	Sep 29, 37	9.8, 11.5	3 55.8 E	13.5	51 25.2 S	10.4, 11.2	.32170	18	EI 18	LAR
Barrow Creek	21 32.0 S	133 53	Sep 30, 37	9.5, 11.4	3 55.8 E	17.4	51 48.3 S	10.2, 11.1	.32170	18	EI 18	LAR
Granites Road, No. 2	21 39.4 S	131 43	Dec 5, 39	9.8, 11.2	3 54.4 E	8.8	52 09.5 S	10.2, 10.8	.31955	18	EI 18	LAR
Conistan Station	22 09.1 S	132 31	Dec 6, 39	10.1, 11.4	4 06.8 E	9.3	52 40.7 S	10.4, 11.1	.31782	18	EI 18	LAR
Winton	22 24.1 S	143 03	Sep 5, 39	10.2, 11.8	6 16.4 E	8.2	51 47.5 S	10.7, 11.4	.31998	18	EI 18	LAR
Ryan's Well	22 43.4 S	133 21	Oct 1, 37	10.1, 12.0	4 31.0 E	....	....	10.6, 11.6	.31637	18	....	LAR
			Oct 1, 37	14.2, 15.6	4 37.2 E	13.8	53 25.8 S	14.6, 15.3	.31596	18	EI 18	LAR
Clermont, A	22 49.2 S	147 39	Jul 13, 39	14.9, 16.5	7 13.9 E	....	....	15.4, 16.2	.32148	18	....	LAR
			Jul 14, 39	....	....	13.9, 14.1	51 29.8 S	....	....	...	EI 18	LAR
Clermont, B	22 49.7 S	147 38	Jan 29, 36	10.8, 11.7	6 56.4 E	10.5, 12.5	51 29.6 S	11.0, 11.5	.32340	28	EI 28	WCP
			Jan 29, 36	14.3, 15.3	6 59.6 E	14.0, 16.2	51 29.7 S	14.6, 15.0	.32290	28	EI 28	WCP
Rockhampton	23 22.0 S	150 30	Jul 2, 36	15.0, 16.2	8 15.2 E	14.2, 16.4	51 45.3 S	15.3, 15.9	.32103	28	EI 28	WCP
			Jul 3, 36	9.3, 10.5	8 12.8 E	9.0, 10.8	51 47.1 S	9.6, 10.2	.32054	28	EI 28	WCP
Longreach, B	23 26.4 S	144 14	Jun 26, 36	16.0, 16.5	6 29.6 E	15.8, 16.7	52 58.6 S	....	....	28	EI 28	WCP
			Jun 27, 36	9.4, 10.8	6 27.3 E	9.0, 11.2	53 00.4 S	9.7, 10.5	.31583	28	EI 28	WCP
Jericho	23 35.7 S	146 08	Sep 2, 39	12.7, 14.3	6 53.2 E	....	....	13.2, 14.0	.31426	18	....	LAR
			Sep 3, 39	....	....	8.6, 8.9	53 07.8 S	....	....	...	EI 18	LAR

AUSTRALASIA

Australia--continued

Station	Latitude	Long. East of Gr	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	°	h h	c.g.s.			
Alice Springs	23 40.8 S	133 54	Oct 2, '37	10.6, 12.1	4 15.6 E	15.5, 15.8	54 34.4 S	11.0, 11.7	.30919	18	EI 18	LAR
Carnarvon	24 52.6 S	113 39	Aug 28, 44	13.7, 14.9	0 59.2 W	13.4, 15.1	58 58.3 S	14.0, 14.6	.27920	18	EI 18	R-C
			Aug 29, 44	9.4, 10.6	1 06.1 W	9.1, 10.8	58 58.5 S	9.7, 10.2	.27974	18	EI 18	R-C
			Aug 29, 44	13.8, 15.5	1 02.6 W	13.4, 16.1	58 58.4 S	14.2, 15.6	.27950	18	EI 18	R-C
Carnarvon	24 53.0 S	113 39	Feb 12, 38	14.8, 15.4	1 22.8 E	....	....	....	....	28	....	WCP
Tambo	24 53.3 S	146 16	Jun 19, 36	11.0, 12.2	7 08.0 E	10.6, 12.6	54 31.3 S	11.3, 11.9	.30942	28	EI 28	WCP
			Jun 19, 36	14.2, 15.3	7 12.5 E	13.9, 15.5	54 36.0 S	14.5, 15.0	.30823	28	EI 28	WCP
Maryborough	25 32.0 S	152 41	Jul 6, 36	10.4, 11.7	8 46.2 E	9.9, 11.9	54 33.4 S	10.7, 11.4	.30805	28	EI 28	WCP
			Jul 6, 36	14.5, 15.7	8 49.6 E	14.2, 15.8	54 33.3 S	14.8, 15.4	.30812	28	EI 28	WCP
Roma	26 34.0 S	148 48	Jun 16, 36	10.3, 11.5	7 50.8 E	9.8, 11.7	56 07.4 S	10.6, 11.2	.30158	28	EI 28	WCP
			Jun 16, 36	14.0, 15.2	7 53.8 E	13.8, 15.4	56 07.6 S	14.3, 14.9	.30163	28	EI 28	WCP
Brisbane, B	27 25.8 S	153 04	Jun 10, 36	10.2, 11.7	9 13.3 E	9.7, 11.9	56 37.0 S	10.6, 11.4	.29732	28	EI 28	WCP
			Jun 10, 36	13.0, 14.2	9 14.7 E	12.8, 14.4	56 37.9 S	13.4, 13.9	.29722	28	EI 28	WCP
Brisbane, C	27 30.6 S	153 08	Jan 26, 44	9.6, 11.0	9 18.0 E	9.2, 11.3	56 46.2 S	10.0, 10.7	.29608	18	EI 18	LAR
			Jan 26, 44	13.4, 14.7	9 23.6 E	13.1, 15.0	56 45.3 S	13.8, 14.4	.29621	18	EI 18	LAR
Toowoomba	27 32.8 S	151 57	Jun 13, 36	10.9, 12.4	8 38.6 E	10.1, 12.8	56 49.2 S	11.2, 12.1	.29744	28	EI 28	WCP
			Jun 13, 36	14.2, 15.4	8 41.6 E	14.0, 15.7	56 49.5 S	14.5, 15.1	.29738	28	EI 28	WCP
Goondiwindi, A	28 33.0 S	150 18	Feb 2, 44	10.0, 11.4	9 29.0 E	9.6, 11.7	58 24.5 S	10.4, 11.0	.28954	18	EI 18	LAR
			Feb 2, 44	13.0, 14.2	9 33.0 E	12.8, 14.5	58 25.4 S	13.4, 13.9	.28936	18	EI 18	LAR
Geraldton, B	28 47.1 S	114 38	Sep 20, 44	10.4, 11.5	2 08.4 W	10.1, 12.3	62 52.3 S	10.7, 11.2	.25724	18	EI 18	R-C
			Sep 20, 44	14.3, 15.9	2 01.8 W	13.8, 16.3	62 52.5 S	14.6, 15.5	.25716	18	EI 18	R-C
Tenterfield	29 04.1 S	152 02	Jan 31, 44	10.1, 11.5	9 22.2 E	9.8, 11.8	58 32.8 S	10.5, 11.2	.28826	18	EI 18	LAR
			Jan 31, 44	13.4, 14.5	9 27.8 E	13.1, 14.9	58 33.2 S	13.6, 14.2	.28836	18	EI 18	LAR
Moree	29 28.5 S	149 50	Jul 11, 36	10.5, 11.5	8 45.6 E	10.2, 11.7	59 36.4 S	10.7, 11.3	.28314	28	EI 28	WCP
			Jul 11, 36	13.8, 14.9	8 45.1 E	13.6, 15.1	59 36.2 S	14.1, 14.6	.28307	28	EI 28	WCP
			Feb 3, 44	9.9, 11.2	8 52.2 E	9.6, 11.5	59 35.6 S	10.2, 10.8	.28274	18	EI 18	LAR
			Feb 3, 44	13.1, 14.3	8 56.0 E	12.8, 14.6	59 37.0 S	13.4, 14.0	.28271	18	EI 18	LAR
Woolgoolga	30 07.2 S	153 12	Jun 4, 36	11.1, 12.5	9 33.7 E	10.6, 12.8	59 35.6 S	11.5, 12.2	.28228	28	EI 28	WCP
			Jun 4, 36	14.1, 15.4	9 36.4 E	13.8, 15.6	59 35.3 S	14.4, 15.0	.28242	28	EI 28	WCP
			Jan 4, 44	9.7, 11.1	9 41.4 E	9.4, 11.4	59 40.0 S	10.1, 10.8	.28139	18	EI 18	LAR
			Jan 4, 44	13.2, 14.5	9 50.4 E	12.9, 14.8	59 40.1 S	13.5, 14.2	.28154	18	EI 18	LAR
Watheroo Observatory (Annual means from magnetograph values)	30 18.9 S	115 52.6	1927	....	4 16.3 W	....	64 11.9 S	....	.24663	7	EI 2	HFJ
			1928	....	4 15.0 W	....	64 13.7 S	....	.24648	7	EI 2	HFJ
			1929	....	4 12.1 W	....	64 15.5 S	....	.24636	7	EI 2	HFJ
			1930	....	4 08.0 W	....	64 17.7 S	....	.24623	7	EI 2	FWW
			1931	....	4 03.3 W	....	64 18.0 S	....	.24638	7	EI 2	WCP
			1932	....	3 58.4 W	....	64 19.1 S	....	.24638	7	EI 2	WCP
			1933	....	3 53.4 W	....	64 19.8 S	....	.24644	7	EI 2	WCP
			1934	....	3 47.8 W	....	64 20.1 S	....	.24653	7	EI 2	WCP
			1935	....	3 42.5 W	....	64 21.0 S	....	.24655	7	EI 2	WCP
			1936	....	3 37.0 W	....	64 21.7 S	....	.24657	7	EI 2	JWG
			1937	....	3 31.7 W	....	64 22.5 S	....	.24657	7	EI 2	JWG
			1938	....	3 26.3 W	....	64 23.3 S	....	.24661	7	EI 2	JWG
			1939	....	3 21.0 W	....	64 23.8 S	....	.24664	7	EI 2	WCP
			1940	....	3 15.8 W	....	64 24.3 S	....	.24676	7	EI 2	WCP

AUSTRALASIA

Australia--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Watheroo Obs'y (Annual means) --concluded	30 18.9 S	115 52.6	1941	....	3 12.3 W	....	64 25.2 S	....	.24679	7	EI 2	WCP
			1942	....	3 08.2 W	....	64 24.8 S	....	.24704	7	EI 2	WCP
			1943	....	3 04.4 W	....	64 25.4 S	....	.24718	7	EI 2	WCP
			1944	....	2 61.1 W	....	64 25.2 S	....	.24745	7	EI 2	WCP
Watheroo Observatory, Nm	30 18.9 S	115 52.6	Jan 22, '35	9.2, 11.0	3 47.0 W	....	....	9.6, 10.6	.24642	7	....	WC
			Jan 23, 35	9.2, 11.2	3 48.0 W	....	....	9.6, 10.7	.24652	7	....	WC
			Jan 24, 35	9.2, 11.0	3 47.1 W	....	....	9.6, 10.5	.24659	7	....	WC
			Jan 29, 35	9.4, 11.2	3 47.0 W	....	....	9.8, 10.7	.24671	7	....	JJH
			Jan 30, 35	9.3, 10.9	3 45.8 W	....	....	9.7, 10.5	.24680	7	....	JJH
			Jan 31, 35	9.2, 10.9	3 44.6 W	....	....	9.6, 10.5	.24660	7	....	JJH
			Jan 15, 36	9.2 to 16.5 (6)	3 39.2 W	....	....	9.6 to 16.1	.24666	7	....	WCP
			Feb 4, 38	10.4	3 32.7 W	....	....	10.8, 11.5	.24650	28	....	WCP
			Feb 4, 38	13.1 to 17.3 (6)	3 25.0 W	....	....	14.2 to 17.0	.24660	28	....	WCP
			Feb 5, 38	9.0 to 10.3 (5)	3 32.8 W	....	....	....	....	28	....	WCP
			Feb 13, 40	8.9, 10.8	3 22.3 W	....	....	9.4, 10.2	.24678	7	....	EMcC
			Feb 14, 40	9.3, 11.2	3 24.7 W	....	....	9.8, 10.8	.24678	7	....	EMcC
			Feb 14, 40	13.1 to 16.4 (4)	3 13.5 W	....	....	13.6, 14.4	.24682	7	....	EMcC
Watheroo Observatory, Sm	30 18.9 S	115 52.6	Apr 8, 35	9.5, 11.2	3 46.0 W	....	....	9.9, 10.8	.24666	7	....	WC
			Apr 9, 35	9.2, 10.8	3 45.2 W	....	....	9.6, 10.4	.24650	7	....	WC
			Apr 10, 35	9.1, 10.6	3 46.7 W	....	....	9.5, 10.2	.24650	7	....	WC
			Apr 11, 35	....	....	....	....	9.6, 10.4	.24608	7	....	WC
			Jan 16, 36	9.3 to 16.0 (6)	3 39.4 W	....	....	9.6 to 15.6	.24677	7	....	WCP
			Feb 19, 36	9.6 to 14.9 (5)	3 40.4 W	....	....	10.0 to 16.6	.24632	28	....	WCP
			Feb 20, 36	7.9 to 16.4 (7)	3 40.7 W	....	....	9.6 to 16.1	.24638	28	....	WCP
			Feb 3, 38	9.4, 11.1, 11.5	3 31.7 W	....	....	9.9, 10.7	.24640	28	....	WCP
			Feb 3, 38	12.9 to 16.8 (4)	3 24.1 W	....	....	13.4 to 16.5	.24630	28	....	WCP
			Feb 4, 38	8.9 to 10.0 (4)	3 32.9 W	....	....	....	....	28	....	WCP
			Feb 15, 40	13.1 to 16.6 (4)	3 13.4 W	....	....	13.6, 14.6	.24678	7	....	EMcC
			Feb 16, 40	10.5, 11.0, 14.8	3 19.3 W	....	....	9.1, 10.0	.24676	7	....	EMcC
			Feb 16, 40	....	....	....	....	13.5, 14.3	.24675	7	....	EMcC
			Feb 19, 40	16.1, 16.6	3 12.3 W	....	....	....	....	7	....	EMcC
Watheroo Observatory, Nw	30 18.9 S	115 52.6	Jan 18, 36	....	....	10.1 to 11.6 (6)	64 19.7 S	....	....	...	EI 2	WCP
			Feb 5, 38	....	....	16.3 to 17.8 (6)	64 24.1 S	....	....	...	EI 28	WCP
			Feb 17, 40	....	....	9.3 to 11.6 (8)	64 23.9 S	....,	....	...	EI 2	EMcC
Watheroo Observatory, Sw	30 18.9 S	115 52.6	Jan 18, 36	....	....	14.0 to 15.5 (6)	64 19.8 S	....	....	...	EI 2	WCP
			Feb 24, 36	....	....	8.6 to 9.8 (4)	64 25.9 S	....	....	...	EI 28	WCP

AUSTRALASIA

Australia--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Watheroo Observatory, Sw--concluded	30 18.9 S	115 52.6	Feb 24, '36	....	....	12.8 to 15.1 (8)	64 23.6 S	....	....	...	EI 28	WCP
			Feb 26, 36	....	....	9.4 to 10.3 (4)	64 25.0 S	....	....	...	EI 28	WCP
			Feb 5, 38	....	....	13.3 to 15.1 (6)	64 23.8 S	....	....	...	EI 28	WCP
			Feb 18, 40	....	....	10.0 to 11.9 (6)	64 22.8 S	....	....	...	EI 2	EMcC
Coolgardie	30 56.9 S	121 08	Mar 14, 36	14.6, 15.9	0 42.8 W	16.3, 16.6	64 09.6 S	15.0, 15.6	.25077	28	EI 28	WCP
			Aug 7, 44	9.9, 11.2	0 14.0 W	9.5, 11.6	64 11.2 S	10.2, 10.9	.25134	18	EI 18	R-C
			Aug 7, 44	13.3, 15.4	0 11.4 W	12.8, 15.8	64 11.4 S	13.9, 15.0	.25151	18	EI 18	R-C
Werris Creek	31 21.6 S	150 39	Jul 13, 36	10.2, 11.5	8 28.2 E	9.8, 11.8	60 59.1 S	10.5, 11.2	.27550	28	EI 28	WCP
			Jul 13, 36	13.7, 14.8	8 30.8 E	12.6, 15.0	61 00.6 S	14.0, 14.5	.27512	28	EI 28	WCP
	31 21.6 S	150	Feb 5, 44	9.8, 11.3, 14.2	8 42.4 E	9.5, 11.7	61 00.2 S	10.2, 10.9	.27507	18	EI 18	LAR
			Feb 5, 44	....	....	12.8, 14.6	61 01.0 S	....	....	...	EI 18	LAR
Merredin	31 28.6 S	118 17	Mar 12, 36	11.6, 12.8	....	10.5, 10.8	65 05.8 S	11.9, 12.5	.24418	28	EI 28	WCP
			Mar 12, 36	14.4, 15.6	2 30.4 W	16.4, 16.7	65 07.0 S	14.7, 15.3	.24432	28	EI 28	WCD
Merredin, A	31 28.6 S	118 18	Oct 7, 44	14.4, 15.4	2 01.2 W	14.1, 15.9	65 09.5 S	14.7, 15.2	.24496	18	EI 18	R-P
Merredin, C	31 28.6 S	118 16	Oct 8, 44	10.4, 11.5	2 18.2 W	10.1, 12.2	65 19.4 S	10.7, 11.2	.24371	18	EI 18	R-P
			Oct 8, 44	13.8, 14.8	2 11.8 W	12.8, 15.1	65 18.8 S	14.0, 14.5	.24376	18	EI 18	R-P
Wilcannia	31 33.5 S	143 22	Oct 28, 44	10.4, 11.5	7 33.1 E	10.2, 12.1	62 26.6 S	10.7, 11.2	.26629	18	EI 18	R-P
			Oct 28, 44	13.2, 14.5	7 37.8 E	14.9, ...	62 26.3 S	13.5, 14.2	.26657	18	EI 18	R-P
Eucla, B	31 43.2 S	128 53	Mar 23, 36	10.0, 11.3	2 22.4 E	9.2, 9.5	64 08.2 S	10.4, 11.0	.25328	28	EI 28	WCP
			Mar 23, 36	13.4, 14.5	2 29.4 E	15.2, 15.7	64 08.4 S	13.7, 14.2	.25333	28	EI 28	WCP
			Jul 22, 44	10.6, 11.9	2 51.8 E	10.2, 12.3	64 04.0 S	10.9, 11.5	.25433	18	EI 18	R-C
			Jul 22, 44	14.3, 15.5	2 54.8 E	14.0, 15.9	64 03.8 S	14.6, 15.2	.25424	18	EI 18	R-C
Mount Yokine	31 53.3 S	115 51	Sep 27, 44	10.2, 11.4	3 22.1 W	9.9, 11.6	65 49.0 S	10.5, 11.1	.23803	18	EI 18	R-C
			Sep 27, 44	13.4, 14.6	3 17.4 W	13.0, 15.0	65 50.0 S	13.7, 14.4	.23788	18	EI 18	R-C
Broken Hill, B	31 55.8 S	141 30	Oct 26, 44	10.7, 12.0	6 25.0 E	10.4, 12.3	62 48.4 S	11.0	.26839	18	EI 18	R-C
			Oct 26, 44	14.8, 15.6	6 29.3 E	14.4	62 47.9 S	11.4	.26387	18	EI 18	R-P
Yalata (Fowler's Bay)	31 56.2 S	132 22	Jul 30, 34	10.6, 10.8	3 13.8 E	14.1	64 23.2 S	11.4, 12.5	.25214	6	226.12	AEM
			Jul 30, 34	12.4, 13.1	3 16.8 E	16.4	64 21.1 S	....	....	6	226.12	AEM
			Jul 19, 44	9.7, 10.8	3 47.0 E	9.1, 11.1	64 19.7 S	10.0, 10.5	.25267	18	EI 18	R-C
			Jul 19, 44	14.0, 16.1	3 49.6 E	13.5	64 19.0 S	14.5, 15.6	.25276	18	EI 18	R-C
Cottesloe, A	31 59.1 S	115 45	Aug 16, 44	11.4, 12.6	3 24.9 W	11.1, 13.0	65 52.2 S	11.7, 12.3	.23764	18	EI 18	R-C
			Aug 16, 44	14.2, 15.4	3 21.6 W	14.0, 16.0	65 52.0 S	14.5, 15.1	.23756	18	EI 18	R-C
Fremantle	32 03.4 S	115 46	Aug 25, 44	10.4, 11.6	3 28.0 W	10.1, 12.0	65 57.3 S	10.7, 11.3	.23704	18	EI 18	R-C
			Aug 25, 44	13.3, 15.0	3 24.8 W	12.8, 15.5	65 57.6 S	13.6, 14.5	.23698	18	EI 18	R-C
Ceduna, C	32 07.6 S	133 40	Jul 15, 44	9.2, 10.4	4 26.8 E	8.9, 10.7	63 52.1 S	9.5, 10.1	.25774	18	EI 18	R-C
			Jul 15, 44	12.7, 13.9	4 28.6 E	12.5, 14.2	63 53.3 S	13.0, 13.6	.25758	18	EI 18	R-C
Ceduna, B	32 07.8 S	133 41	Mar 27, 36	10.2, 11.4	3 56.1 E	9.8, 11.6	63 53.7 S	10.5, 11.1	.25766	28	EI 28	WCP
			Mar 27, 36	14.6, 15.6	3 59.2 E	14.3, 15.9	63 53.4 S	14.9, 15.4	.25779	28	EI 28	WCP
			Jul 16, 44	10.5, 11.9	4 20.0 E	10.2, 12.2	63 47.7 S	10.9, 11.6	.25876	18	EI 18	R-C
Ceduna, A	32 08.2 S	133 40	Jul 25, 34	11.6, 17.4	4 17.4 E	....	....	15.4, 16.5	.25408	6	....	AEM
			Jul 26, 34	12.5, 14.3, 14.6	4 16.7 E	10.5, 11.4	64 11.9 S	....	....	6	226.12	AEM

AUSTRALASIA

Australia--continued

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Norseman	32 12.4 S	121 47	Jun 13, '38	14.1, 15.9	0 37.3 W	11.6, 11.9	65 27.0 S	14.6, 15.5	.24188	18	EI 18	LAR
			Aug 4, 44	10.1, 11.2	0 16.2 W	9.8, 11.6	65 27.0 S	10.4, 11.0	.24277	18	EI 18	R-C
			Aug 4, 44	13.7, 14.9	0 14.0 W	13.4, 15.4	65 27.1 S	14.0, 14.6	.24279	18	EI 18	R-C
Balladonia	32 28.1 S	123 52	Mar 17, 36	11.9, 13.1	0 19.1 E	11.2, 11.5	65 44.0 S	12.2, 12.8	.24070	28	EI 28	WCP
			Mar 17, 36	14.5, 16.5	0 21.6 E	16.9, 17.2	65 43.4 S	14.8, 16.2	.24070	28	EI 28	WCP
			Jul 26, 44	11.0, 12.4	0 53.8 E	10.7, 12.8	65 39.0 S	11.4	.24195	18	EI 18	R-C
			Jul 26, 44	14.5	0 56.1 E	14.2	65 40.2 S	12.1	.24185	18	EI 18	R-C
Balladonia, B	32 27.9 S	123 53	Oct 17, 44	11.0, 11.5	1 06.2 E	13.6	65 40.1 S	14.3	.24014	18	EI 18	R-P
			Oct 17, 44	14.0, 15.0	1 12.4 E	15.4	65 40.6 S	14.8	.24026	18	EI 18	R-P
Port Augusta	32 29.7 S	137 46	Mar 30, 36	10.0, 11.2	5 14.2 E	9.4, 9.6	64 30.4 S	10.4, 10.9	.25292	28	EI 28	WCP
			Mar 30, 36	12.8, 14.6	5 21.3 E	11.5, 11.7	64 29.6 S	13.9, 14.3	.25309	28	EI 28	WCP
Port Augusta, A	32 29.7 S	137 46	Jul 6, 44	10.7, 12.0	5 35.3 E	10.3, 12.4	64 26.1 S	11.1, 11.7	.25356	18	EI 18	R-C
			Jul 6, 44	14.7, 15.9	5 38.5 E	14.4, 16.3	64 27.1 S	15.1, 15.6	.25351	18	EI 18	R-C
Port Augusta, C	32 30.4 S	137 46	Jul 7, 44	10.5, 11.8	5 41.4 E	10.3, 12.4	64 33.3 S	10.8, 11.4	.25294	18	EI 18	R-C
			Jul 7, 44	13.9, 15.1	5 43.6 E	13.7, 15.3	64 33.8 S	14.2, 14.8	.25284	18	EI 18	R-C
Wellington	32 33.7 S	148 56	Sep 4, 36	14.5, 16.0	8 56.2 E	11.3, 12.3	62 35.6 S	15.0, 15.7	.26424	28	EI 28	WCP
			Sep 5, 36	10.0, 11.2	8 49.2 E	9.4, 11.5	62 36.2 S	10.3, 10.9	.26432	28	EI 28	WCP
			Feb 7, 44	10.5, 12.0	9 07.2 E	10.2, 12.3	62 37.8 S	10.9, 11.6	.26396	18	EI 18	LAR
			Feb 7, 44	13.6, 14.7	9 10.9 E	13.4, 15.0	62 37.8 S	13.9, 14.4	.26393	18	EI 18	LAR
Yunta	32 35.0 S	139 34	Oct 24, 44	10.4, 11.5	6 38.6 E	10.0, 12.6	63 44.5 S	10.7, 11.3	.25770	18	EI 18	R-P
			Oct 24, 44	14.1, 15.1	6 44.4 E	15.5	63 43.8 S	14.4, 14.9	.25800	18	EI 18	R-P
Port Stephens	32 43.4 S	152 10	Jun 5, 43	13.8, 15.4	10 17.4 E	13.3, 15.9	62 34.4 S	14.2, 15.0	.26568	18	EI 18	LAR
East Maitland	32 45.6 S	151 34	Jun 8, 43	10.7, 12.0	10 05.2 E	10.2, 12.3	62 32.4 S	11.0, 11.7	.26531	18	EI 18	LAR
			Jun 8, 43	13.8, 15.2	10 08.8 E	13.4, 15.5	62 33.9 S	14.2, 14.8	.26514	18	EI 18	LAR
Flinders	32 47.9 S	134 14	Aug 2, 34	....	....	16.5	64 43.3 S	....	....	...	226.12	AEM
			Aug 3, 34	10.4 to 14.8 (4)	3 35.6 E	16.5	64 43.2 S	11.0, 12.1	.25275	6	216.12	AEM
Bunbury, B	33 20.8 S	115 38	Feb 10, 36	10.7, 12.5	4 50.8 W	9.6, 10.0	67 11.8 S	11.2, 12.1	.22724	28	EI 28	WCP
			Feb 10, 36	13.7, 15.2	4 40.0 W	16.3, 16.5	67 09.2 S	14.0, 14.9	.22728	28	EI 28	WCP
			Sep 29, 44	10.9, 12.1	4 03.8 W	10.5, 12.4	67 14.1 S	11.2, 11.9	.22777	18	EI 18	LAR
			Sep 29, 44	13.9, 15.1	4 00.6 W	13.7, 15.4	67 13.9 S	14.2, 14.8	.22788	18	EI 18	LAR
Bombi	33 30.7 S	151 25	May 21, 43	10.0, 11.5	10 03.2 E	9.5, 12.0	63 23.8 S	10.5, 11.2	.25964	18	EI 18	LAR
Collaroy	33 43.8 S	151 17	Apr 19, 43	10.0, 11.6	9 58.9 E	12.2	63 37.4 S	10.4, 11.3	.25809	18	EI 18	LAR
Red Hill, A	33 44.5 S	151 04	May 4, 36	10.8, 12.1	9 37.4 E	10.0 to 12.8 (4)	63 35.9 S	11.2, 11.8	.25862	28	EI 28	WCP
			May 4, 36	13.8, 15.5	9 43.3 E	13.3 to 16.1 (4)	63 36.0 S	14.2, 15.2	.25836	28	EI 28	WCP
Blacktown, A	33 45.8 S	150 55	Feb 27, 37	9.4, 11.7	9 32.0 E	....	....	10.0, 11.1	.25740	28	....	WCP
			Feb 27, 37	15.0, 16.9	9 42.0 E	....	....	15.5, 16.5	.25794	28	....	WCP
			Feb 28, 37	9.4, 11.2	9 28.7 E	....	....	9.9, 10.8	.25748	28	....	WCP
			Mar 1, 37	9.4 to 16.8 (6)	9 37.0 E	....	....	9.9 to 16.4	.25765	18	....	LAR
			Mar 2, 37	....	....	9.8 to 12.2 (6)	63 42.8 S	....	....	...	EI 18	LAR
			Mar 2, 37	....	....	12.9 to 15.5 (6)	63 42.8 S	....	....	...	EI 28	WCP
Blacktown, B	33 45.8 S	150 55	Feb 27, 37	9.4, 11.7	9 34.5 E	....	....	10.0, 11.1	.25738	18	....	LAR
			Feb 27, 37	15.0, 16.9	9 45.9 E	....	....	15.4, 16.5	.25787	18	....	LAR

AUSTRALASIA

Australia--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Blacktown, B--concluded	33 45.8 S	150 55	Feb 28, '37	9.4, 11.2	9 32.6 E	....	....	9.9, 10.7	.25754	18	....	LAR
			Mar 1, 37	9.4, 11.1, 11.6	9 36.4 E	....	....	9.9 to 12.1	.25760	28	....	WCP
			Mar 1, 37	14.7, 15.2, 16.8	9 45.3 E	....	....	14.3 to 16.5	.25804	28	....	WCP
			Mar 2, 37	....	....	9.8 to 12.2 (6)	63 44.2 S	....	....	...	EI 28	WCP
			Mar 2, 37	....	....	12.9 to 15.5 (6)	63 43.2 S	....	....	...	EI 18	LAR
			Aug 27, 37	....	....	15.2	63 40.6 S	....	....	...	EI 28	WCP
			Aug 28, 37	10.1, 11.4	9 39.3 E	9.3, 11.6	63 40.6 S	10.4, 11.0	.25787	28	EI 28	WCP
			Aug 29, 37	6.6 to 16.3 (dv)	9 39.9 E	....	....	....	....	28	....	WCP
			Jan 18, 38	....	....	....	....	10.0, 12.7	.25664	28	....	WCP
			Jan 18, 38	....	....	....	....	11.2, 11.9	.25670	18	....	LAR
			Jan 18, 38	....	....	....	....	13.4, 15.2	.25710	18	....	LAR
			Jan 18, 38	....	....	....	....	14.1, 14.6	.25708	28	....	WCP
			Jan 18, 38	....	....	....	....	15.8, 17.3	.25734	18	....	LAR
			Jan 18, 38	....	....	....	....	16.3, 16.7	.25720	28	....	WCP
			Jan 19, 38	13.9, 14.6	9 47.0 E	9.5, 10.3	63 45.5 S	....	....	28	EI 28	WCP
			Jan 19, 38	14.2, 14.4	9 46.8 E	9.9, 10.1	63 44.0 S	....	....	18	EI 18	LAR
			Jan 19, 38	14.8, 15.4	9 47.0 E	10.4, 11.3	63 45.8 S	....	....	28	EI 28	WCP
			Jan 19, 38	15.0, 15.2	9 46.1 E	10.8, 11.1	63 43.6 S	....	....	18	EI 18	LAR
			Jan 19, 38	15.6, 16.2	9 45.4 E	11.5, 12.1	63 44.2 S	....	....	28	EI 28	WCP
			Jan 19, 38	15.8, 16.0	9 44.8 E	11.7, 11.9	63 43.0 S	....	....	18	EI 18	LAR
			Apr 28, 39	10.6, 12.6	9 41.8 E	....	....	11.2, 12.1	.25710	18	....	LAR
			Apr 29, 39	14.2, 16.0	9 46.2 E	12.7	63 42.1 S	14.6, 15.5	.25731	18	EI 18	LAR
			Jan 4, 40	9.4, 11.3	9 43.6 E	11.7, 12.8	63 43.2 S	9.9, 10.8	.25686	18	EI 18	LAR
			Jan 5, 40	9.6, 11.2	9 41.4 E	8.4, 8.7	63 43.1 S	10.0, 10.8	.25748	18	EI 18	LAR
			Apr 3, 40	....	....	13.8 to 16.9 (4)	63 49.6 S	....	....	...	EI 18	LAR
			Apr 4, 40	9.2 to 13.0 (4)	9 43.9 E	....	....	9.6 to 12.7	.25698	18	....	LAR
			Apr 5, 40	14.6, 16.0	9 47.8 E	....	....	14.9, 15.7	.25734	18	....	LAR
			Jun 30, 41	14.2, 15.7	9 49.0 E	16.6	63 40.7 S	14.6, 15.4	.25730	18	EI 18	LAR
			Jan 24, 42	9.8, 11.3	9 45.8 E	....	....	10.2, 10.9	.25730	18	....	LAR
			Jan 26, 42	....	....	11.3	63 41.1 S	....	....	...	EI 18	LAR
			Jan 26, 43	15.9, 16.2	9 58.2 E	....	....	....	....	18	....	LAR
			Jan 27, 43	9.7, 11.3	9 51.2 E	9.2, 11.8	63 42.2 S	10.0, 10.8	.25704	18	EI 18	LAR
			Jan 27, 43	14.1, 14.3	9 56.2 E	....	....	....	....	18	....	LAR
			Apr 3, 43	14.2, 15.9	9 56.4 E	16.6	63 46.5 S	14.7, 15.5	.25690	18	EI 18	LAR
			Jun 10, 43	10.1, 11.6	9 52.9 E	9.7, 11.9	63 42.2 S	10.5, 11.2	.25722	18	EI 18	LAR
			Jun 10, 43	13.3, 14.7	9 56.2 E	12.9, 15.1	63 43.0 S	13.6, 14.4	.25708	18	EI 18	LAR
			Mar 4, 44	10.7, 12.1, 15.1	9 57.7 E	10.3, 12.5	63 42.0 S	11.0, 11.7	.25728	18	EI 18	LAR
			Mar 4, 44	13.8	10 01.1 E	13.5, 15.5	63 42.6 S	....	....	...	EI 18	LAR
Bradley Head[m]	33 51.2 S	151 16	Mar 16, 44	14.8, 15.4	10 09.2 E	....	....	....	....	18	....	LAR
			Mar 17, 44	9.2, 10.5	10 02.1 E	8.8, 10.9	63 46.2 S	9.5, 10.2	.25708	18	EI 18	LAR
			Mar 17, 44	13.0, 14.3	10 08.4 E	12.7, 14.7	63 46.0 S	13.4, 14.0	.25721	18	EI 18	LAR

[m] Some disturbance from electric car lines of Sydney.

AUSTRALASIA

Australia--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Shark Island[m]	33 51.6 S	151 16	Mar 8, '44	13.2, 14.5	10 13.6 E	12.9, 14.8	63 49.8 S	13.5, 14.2	.25690	18	EI 18	LAR
Esperance, B	33 51.9 S	121 53	Oct 14, 44	10.3, 12.2	0 53.8 W	....	....	10.8, 11.8	.23140	18	....	R-P
			Oct 14, 44	14.2, 15.4	0 49.6 W	....	....	14.6, 15.3	.23158	18	....	R-P
			Oct 15, 44	....	....	10.8, 12.8	67 06.3 S	11.2, 12.2	.23084	18	EI 18	R-P
Lillipilli	34 04.2 S	151 07	May 9, 43	14.8, 16.0	10 10.4 E	....	....	....	....	18	....	LAR
			May 10, 43	9.8, 11.4	10 06.2 E	9.4, 11.8	63 47.8 S	10.3, 11.0	.25690	18	EI 18	LAR
			May 10, 43	14.7, 16.2	10 10.0 E	14.4, 16.6	63 49.3 S	15.0, 15.8	.25678	18	EI 18	LAR
Mildura	34 11.4 S	142 10	Oct 30, 44	10.0, 11.1	7 16.8 E	9.8, 11.4	65 09.7 S	10.3, 10.8	.24873	18	EI 18	R-P
			Oct 30, 44	13.5, 14.6	7 24.2 E	13.2, 15.1	65 08.8 S	13.8, 14.3	.24881	18	EI 18	R-P
Augusta	34 19.7 S	115 10	Oct 2, 44	11.1, 11.5	4 34.0 W	13.9	68 23.5 S	14.4	.21772	18	EI 18	R-P
			Oct 2, 44	14.1, 15.3	4 28.6 W	15.6	68 23.2 S	15.0	.21782	18	EI 18	R-P
Maitland	34 22.0 S	137 40	Mar 18, 36	....	....	16.7	66 22.0 S	....	....	...	226.12	AEM
			Mar 19, 36	10.3 to 15.7 (4)	6 27.2 E	....	....	10.9, 12.1	.23914	6	....	AEM
Ardrossan	34 24.9 S	137 54	Mar 17, 36	10.6, 15.2	3 13.2 E	....	....	10.8, 14.5	.23703	6	....	AEM
			Mar 18, 36	9.5, 9.8	3 12.0 E	10.8	66 45.0 S	....	....	6	226.12	AEM
Hay	34 30.4 S	144 51	Nov 1, 44	10.3, 11.6	8 18.2 E	10.0	65 11.8 S	10.6	.24805	18	EI 18	R-P
			Nov 1, 44	13.7, 14.3	8 24.3 E	12.2	65 10.8 S	11.3	.24796	18	EI 18	R-P
Port Lincoln, A	34 42.6 S	135 52	Jul 10, 44	9.6, 10.9	4 06.5 E	9.3, 11.2	66 18.4 S	9.9, 10.5	.24054	18	EI 18	R-C
			Jul 10, 44	13.1, 14.3	4 07.4 E	12.8, 14.6	66 19.4 S	13.4, 14.0	.24024	18	EI 18	R-C
Port Lincoln, B	34 43.4 S	135 52	Jul 11, 44	11.2, 12.5	4 07.6 E	10.9, 12.8	66 20.5 S	11.6, 12.2	.24016	18	EI 18	R-C
Adelaide, West Park	34 55.7 S	138 35	Jun 29, 44	10.4, 11.8	6 24.9 E	10.1, 12.1	66 24.9 S	10.8, 11.4	.23895	18	EI 18	R-C
			Jun 29, 44	13.7, 15.0	6 27.0 E	13.5, 15.3	66 25.9 S	14.0, 14.7	.23853	18	EI 18	R-C
Belair, A	35 00.3 S	138 37	Apr 2, 36	10.1, 12.0	5 39.5 E	....	....	10.7, 11.5	.23853	6	....	AEM
			Apr 2, 36	14.5, 16.1, 16.4	5 46.6 E	....	....	14.9 to 16.8	.23873	6	....	AEM
			Apr 3, 36	10.2	5 37.1 E	....	....	9.7	.23865	6	....	AEM
			Apr 3, 36	10.9, 12.8	5 41.0 E	....	....	11.4, 12.3	.23860	28	....	WCP
			Apr 3, 36	13.8 to 17.5 (4)	5 45.4 E	....	....	14.2 to 17.1	.23881	28	....	WCP
			Apr 6, 36	....	....	10.3 to 12.1 (6)	66 31.4 S	....	....	...	226.12	AEM
			Apr 6, 36	....	....	14.5 to 16.3 (6)	66 33.5 S	....	....	...	EI 28	WCP
			Jun 30, 44	10.5, 11.8	6 06.1 E	10.3, 12.1	66 30.5 S	10.8, 11.4	.23918	18	EI 18	R-C
			Jun 30, 44	13.4, 14.6	6 07.4 E	13.1, 15.2	66 30.7 S	13.7, 14.3	.23902	18	EI 18	R-C
Belair, B	35 00.3 S	138 37	Apr 2, 36	10.2, 12.0	5 41.0 E	....	....	10.7, 11.5	.23858	28	....	WCP
			Apr 2, 36	14.5, 16.1, 16.4	5 47.6 E	....	....	14.9 to 16.9	.23877	28	....	WCP
			Apr 3, 36	10.2	5 39.5 E	....	....	9.7	.23876	28	....	WCP
			Apr 3, 36	10.9, 12.8	5 41.2 E	....	....	11.4, 12.3	.23859	6	....	AEM
			Apr 3, 36	13.8 to 17.5 (4)	5 46.7 E	....	....	14.2 to 17.1	.23890	6	....	AEM
			Apr 6, 36	....	....	10.3 to 12.1 (6)	66 34.6 S	....	....	...	EI 28	WCP
			Apr 6, 36	....	....	14.5 to 16.3 (6)	66 34.6 S	....	....	...	226.12	AEM
Albany, B	35 00.9 S	117 53	Feb 15, 36	10.3, 12.3	4 38.6 W	9.5, 9.7	68 07.4 S	10.7, 11.7	.22198	28	EI 28	WCP
			Feb 15, 36	14.4, 15.6	4 29.9 W	16.0, 16.1	68 05.2 S	14.7, 15.3	.22210	28	EI 28	WCP
			Oct 4, 44	10.6, 11.8	3 50.2 W	10.4, 12.2	68 08.5 S	10.9, 11.5	.22271	18	EI 18	R-P
			Oct 4, 44	13.1, 15.7	3 47.6 W	13.8, 16.0	68 07.9 S	14.5, 15.3	.22276	18	EI 18	R-P

[m] Some disturbance from electric car lines of Sydney.

AUSTRALASIA

Australia--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Yorketown	35 01.2 S	137 37	Mar 20, '36	14.1, 16.0	5 17.0 E	12.3	66 47.1 S	14.6, 15.5	.23652	6	226.12	AEM
Nairne	35 02.3 S	138 55	Apr 27, 34	13.7, 16.8	6 30.4 E	....	....	16.1	.23811	6	....	D-M
			Apr 28, 34	....	....	10.3, 11.0	66 25.8 S	....	....	...	226.12	D-M
Edithburgh	35 04.3 S	137 44	Mar 21, 36	14.4, 16.5	5 36.2 E	12.0	66 51.4 S	15.0, 16.0	.23540	6	226.12	AEM
Kuitpo Forest	35 12.8 S	138 43	Apr 25, 34	....	....	13.4, 14.1	66 50.2 S	....	....	...	226.12	D-M
			Apr 26, 34	10.4, 12.5	6 46.6 E	....	....	11.0	.23734	6	....	D-M
			Apr 26, 34	14.3, 16.2	6 51.8 E	....	....	14.7, 15.8	.23675	6	....	D-M
Strathalbyn	35 15.4 S	138 53	Apr 23, 34	10.4, 10.7, 12.1	6 27.5 E	....	....	11.3, 12.5	.23664	6	....	ALD
			Apr 23, 34	14.8, 16.9	6 20.9 E	....	....	15.2, 16.4	.23653	6	....	ALD
			Apr 24, 34	....	....	11.5, 14.3	66 39.4 S	....	....	...	226.12	ALD
Goolwa	35 30.0 S	138 48	Apr 20, 34	10.9	5 43.1 E	....	....	11.4, 12.7	.23510	6	....	D-M
			Apr 20, 34	16.1, 16.3, 16.8	5 50.1 E	....	....	....	....	6	....	D-M
			Apr 21, 34	....	....	10.6, 11.3	66 52.7 S	....	....	...	226.12	D-M
Port Victor	35 33.7 S	138 33	Apr 18, 34	10.6, 10.8, 12.2	6 13.8 E	....	....	11.4	.23376	6	....	D-M
			Apr 18, 34	16.4	6 06.1 E	....	....	14.6, 15.6	.23383	6	....	D-M
			Apr 19, 34	....	....	10.8 to 14.0 (4)	67 01.3 S	....	....	...	226.12	D-M
Moruya	35 55.1 S	150 06	May 6, 36	12.6, 14.7	8 30.2 E	11.8 to 16.3 (4)	65 29.9 S	13.0, 14.4	.24858	28	EI 28	WCP
			May 7, 36	9.6, 10.8	8 26.2 E	....	....	9.9, 10.4	.24872	28	....	WCP
Bordertown	36 18.9 S	140 46	Jun 25, 44	9.8, 11.2	7 08.0 E	9.2, 11.4	67 24.7 S	10.2, 10.8	.23300	18	EI 18	R-C
			Jun 25, 44	13.7, 15.0	7 10.2 E	13.5, 15.2	67 25.1 S	14.0, 14.6	.23269	18	EI 18	R-C
Toolangi, Inductor Pier	37 33.4 S	145 29	Aug 7, 36	....	....	14.0 to 17.1 (12)	67 50.6 S	....	....	...	EI 28	WCP
Toolangi, Magnetometer pier	37 33.4 S	145 29	Aug 8, 36	10.8 to 16.4 (12)	8 40.8 E	....	....	....	....	28	....	WCP
			Aug 9, 36	....	....	....	....	10.0 to 15.7	.22875	28	....	WCP
			Aug 10, 36	....	....	....	....	9.7 to 11.7	.22880	28	....	WCP
Portland	38 20.6 S	141 37	Apr 9, 36	11.0, 12.4	6 53.8 E	10.6, 12.7	69 12.7 S	11.4, 12.1	.21811	28	EI 28	WCP
			Apr 9, 36	13.9, 15.1	6 59.2 E	13.7, 15.4	69 11.9 S	14.3, 14.8	.21824	28	EI 28	WCP
Longford	41 35.9 S	147 06	Aug 25, 36	10.7, 11.9	9 54.8 E	10.3, 12.1	71 02.4 S	11.0, 11.6	.20258	28	EI 28	WCP
			Aug 25, 36	14.0, 15.3	10 00.0 E	12.6, 15.8	71 02.7 S	14.3, 14.9	.20279	28	EI 28	WCP
Sorell, B	42 47.0 S	147 33	Aug 20, 36	10.3, 11.7	11 59.0 E	9.8, 12.1	71 53.4 S	10.6, 11.4	.19581	28	EI 28	WCP
			Aug 20, 36	13.8, 15.0	12 05.6 E	12.5, 15.4	71 53.1 S	14.1, 14.7	.19559	28	EI 28	WCP

New Zealand

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s			
Auckland (Hobsonville)	36 47.4 S	174 40	Jan 18, '37	11.5, 14.0	15 47.8 E	10.2, 14.2	62 25.2 S	11.8, 13.7	.25971	28	EI 28	WCP
Auckland, (Domain)	36 51.7 S	174 46	Jan 19, 37	11.4, 13.3, 14.5	16 25.6 E	11.0, 13.7	62 19.5 S	11.7, 13.0	.25942	28	EI 28	WCP
Opotiki	37 59.8 S	177 17	Jan 26, 37	15.1, 16.1	16 33.6 E	14.7, 16.4	62 54.8 S	15.4, 15.9	.25573	28	EI 28	WCP
			Jan 27, 37	9.4, 10.3	16 27.2 E	....	....	....	....	28	....	WCP

AUSTRALASIA

New Zealand--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Te Awamutu	38 00.7 S	175 20	Jan 21, '37	10.2, 11.5	16 35.4 E	9.8, 11.9	63 18.7 S	10.5, 11.2	.25408	28	EI 28	WCP
			Jan 21, 37	14.1, 15.4	16 43.0 E	13.8, 15.6	63 18.8 S	14.4, 15.1	.25428	28	EI 28	WCP
Rotorua	38 08.2 S	176 15	Jan 25, 37	10.3, 11.4	16 01.2 E	9.9, 11.6	63 16.0 S	10.6, 11.1	.25262	28	EI 28	WCP
			Jan 25, 37	14.1, 15.2	16 06.6 E	13.8, 15.4	63 14.6 S	14.4, 14.9	.25326	28	EI 28	WCP
Napier	39 30.2 S	176 55	Jan 29, 37	9.5, 10.8	17 07.1 E	9.1, 11.4	64 15.4 S	9.9, 10.5	.24742	28	EI 28	WCP
			Jan 30, 37	9.3	17 07.6 E	....	....	....	....	28	....	WCP
Eketahuna	40 38.8 S	175 43	Jan 9, 37	10.7, 11.9	17 27.6 E	10.1, 12.1	65 33.7 S	11.0, 11.6	.23962	28	EI 28	WCP
			Jan 9, 37	14.8, 16.2	17 29.6 E	14.4, 16.4	65 31.6 S	15.2, 15.9	.23976	28	EI 28	WCP
Amberley, Absolute peg	40 10 S	172 43	Mar 17, 30	14.6, 15.7	17 50.8 E	17.6	67 59.2 S[n]	12.0, 13.0	.22306	8	242.12	F[illegible]
			Mar 17, 30	....	....	17.7	67 58.6 S	....	....	...	242.34	FTD
Amberley, East pier	43 10 S	172 43	Dec 24, 36	13.1 to 17.3 (5)	18 15.6 E	....	....	13.6 to 16.5	.22318	28	....	WCP
			Dec 25, 36	6.8 to 10.9 (4)	18 08.0 E	....	....	7.2 to 11.2	.22300	28	....	WCP
			Dec 25, 36	14.2, 14.8, 16.3	18 16.0 E	....	....	13.9 to 16.0	.22336	28	....	WCP
Amberley, West pier	43 10 S	172 43	Jan 7, 37	....	....	10.0 to 11.1 (4)	68 03.4 S	....	....	...	EI 28	WCP
Amberley, 1 meter south of west pier	43 10 S	172 43	Dec 25, 36	....	....	18.6 to 19.4 (4)	68 00.3 S	....	....	...	EI 28	WCP
			Dec 26, 36	....	....	6.9 to 10.0 (8)	68 05.2 S	....	....	...	EI 28	WCP
Queenstown	45 02.4 S	168 41	Jan 1, 37	9.2, 11.1	18 26.4 E	8.8, 11.3	70 11.2 S	9.5, 10.8	.20748	28	EI 28	WCP
			Jan 1, 37	12.6, 14.4	18 38.4 E	12.4, 14.6	70 08.2 S	12.9, 14.0	.20790	28	EI 28	WCP
Kingston	45 19.7 S	168 43	Dec 31, 36	8.7, 10.0	18 34.1 E	8.3, 10.4	70 20.1 S	9.1, 9.7	.20643	28	EI 28	WCP
			Dec 31, 36	12.4, 13.5	18 50.6 E	10.9, 13.8	70 18.6 S	12.7, 13.2	.20655	28	EI 28	WCP
Roxburgh	45 33.7 S	169 20	Jan 3, 37	10.0, 11.4	18 38.8 E	9.6, 11.6	70 25.2 S	10.3, 11.1	.20530	28	EI 28	WCP
			Jan 3, 37	13.8, 15.0	18 51.4 E	13.6, 15.2	70 24.2 S	14.2, 14.7	.20570	28	EI 28	WCP
Clinton, A	46 12.6 S	169 22	Dec 28, 36	14.2	20 14.9 E	15.0	70 44.3 S	....	....	28	EI 28	WCP
			Dec 29, 36	8.4, 9.9	20 02.4 E	8.1, 10.5	70 49.8 S	8.8, 9.5	.20352	28	EI 28	WCP
			Dec 29, 36	14.0, 15.2	20 19.2 E	13.6, 15.5	70 45.6 S	14.3, 14.8	.20432	28	EI 28	WCP
Clinton, B	46 12.6 S	169 22	Dec 29, 36	12.9	20 12.7 E	....	....	....	....	28	....	WCP
Clinton, C	46 12.6 S	169 21	Dec 30, 36	5.9	19 33.4 E	....	....	....	....	28	....	WCP

[n] From deflections.

EUROPE

Germany

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Hamburg, Finkenwärder Is., A	53 32.4 N	9 51	Jul 3, '28	....	....	....	....	12.5 to 15.4	.17889	24	....	CVII
Hamburg, Finkenwärder Is., B	53 32.4 N	9 51	Jul 2, 28	....	....	....	....	11.8 to 14.7	.17924	12	....	CVII
			Jul 3, 28	....	....	....	....	10.8, 11.5	.17900	12	....	CVII
			Jul 4, 28	....	....	....	....	10.8 to 12.8	.17884	24	....	CVII
Seddin	52 16.7 N	13 01	Jun 27, 28	10.8 to 14.6 (4)	6 04.4 W	....	....	11.2 to 14.3	.18492	24	....	CVII
			Jun 29, 28	12.5 to 18.8 (8)	6 03.6 W	....	....	13.4 to 18.5	.18501	24	....	CVII

EUROPE

Germany--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Seddin--concluded	52 16.7 N	13 01	Jun 30, '28	11.4, 12.6	6 04.3 W	14.0 to 16.2 (6)	66 42.4 N	12.2, 12.9	.18506	24	EI 24	CVII
			Jun 30, 28	....	....	16.4 to 17.7 (6)	66 41.9 N	....	....	...	EI 24	CVII
Niemegk	52 04.0 N	12 40	Jul 4, 35	....	....	14.9 to 16.7 (6)	66 49.1 N	....	....	...	EI 18	RHM
			Jul 5, 35	7.4, 10.3	4 55.8 W	....	....	8.5, 9.7	.18449	18	....	RHM
			Jul 5, 35	13.1 to 17.3 (4)	4 58.6 W	....	....	13.6 to 16.8	.18496	18	....	RHM
			Jul 6, 35	7.3, 9.2, 9.7	4 52.7 W	15.7 to 17.1 (6)	66 49.2 N	7.8 to 11.4	.18462	18	EI 18	RHM
			Jul 6, 35	12.3, 12.7, 14.8	5 02.4 W	....	....	13.2, 14.2	.18490	18	....	RHM
Great Britain												
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Abinger Observatory	51 11.1 N	359 37	Jul 16, '35	16.0	11 34.9 W	11.6 to 15.0 (6)	66 40.2 N	....	....	18	EI 18	RHM
			Jul 17, 35	15.6	11 34.8 W	....	....	13.7, 14.9	.18544	18	....	RHM
			Jul 18, 35	8.7 to 16.3 (5)	11 32.3 W	....	....	9.2 to 15.3	.18523	18	....	RHM
			Jul 19, 35	10.6 to 17.8 (5)	11 35.7 W	....	....	9.0 to 17.4	.18530	18	....	RHM
			Jul 20, 35	....	....	10.7 to 12.1 (6)	66 41.8 N	....	....	...	EI 18	RHM
Norway												
	° ′	°		h h h	° ′	h h	° ′	h h	c.g.s.			
Arctic Ice	81 40 N	24 45	Sep 2, '31	....	....	16.7, 16.9	82 46 N	....	....	...	242.56	FMS
			Sep 2, 31	....	....	17.7	82 48 N	17.5	.0680	242	242.34	FMS
Longyear City (Spitzbergen)	78 13 N	15 40	Aug 17, 31	....	....	13.2	80 52.6 N	....	....	...	242.56	FMS
			Aug 17, 31	....	....	13.2	80 53.3 N	13.2	.0839	242	242.34	FMS
Dombaas, A	62 04.8 N	9 08	Jul 15, 31	10.2 to 11.3 (4)	8 44.1 W	17.9	73 14.5 N	....	....	B3578	242.56	FMS
			Jul 15, 31	14.2, 14.6	8 45.0 W	17.7	73 14.9 N	17.8	.1410	242	242.34	FMS
Dombaas, B	62 04.8 N	9 08	Jul 13, 31	14.1, 14.4, 16.2	8 41.9 W	....	....	....	....	242	....	FMS
			Jul 14, 31	....	....	9.8, 16.4	73 11.5 N	9.9, 16.4	.1409	242	242.34	FMS
			Jul 14, 31	....	....	10.0, 16.4	73 15.2 N	....	....	...	242.56	FMS
			Jul 16, 31	9.2 to 10.1 (4)	8 33.5 W	....	....	....	....	B3578	....	FMS
Hop, A	60 19.2 N	5 19	May 28, 31	9.4, 9.7	10 40.0 W	11.9	72 23.9 N	....	....	242	242.56	FMS
			May 28, 31	....	....	11.9	72 24.4 N	12.0	.1469	242	242.34	FMS
			Jun 7, 8, 31	11.3 to 11.3 (dv)	10 40.1 W	....	....	....	....	B3578	....	FMS
			Sep 19, 31	9.7, 15.5, 16.5	10 39.9 W	12.8	72 18.6 N	....	....	B3578	242.56	FMS
			Sep 19, 31	....	....	12.7	72 18.7 N	12.8	.1478	242	242.34	FMS
Hop, B	60 19.2 N	5 19	May 28, 31	15.1, 15.6	10 45.0 W	17.2	72 15.2 N	....	....	242	242.56	FMS
			May 28, 31	....	....	17.2	72 15.3 N	17.2	.1482	242	242.34	FMS
			Sep 20, 31	13.4, 14.6	10 40.2 W	10.8	72 17.4 N	....	....	242	242.56	FMS
			Sep 20, 31	....	....	10.8	72 17.8 N	10.8	.1480	242	242.34	FMS
Besserud (Oslo)	59 59.1 N	10 43	Apr 15, 29	10.6, 10.9	8 20.6 W	13.9, 14.0	71 33.0 N	12.0, 12.4	.15886	25	EI 25	OD

NORTH AMERICA

Alaska

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Point Barrow°	71 23 N	203 43	Oct '32	12.3	28 43 E	12.6	80 41 N	12.6	.09226	242	242.1 (234)	CJM
			Nov 32	12.8	28 47 E	12.9	80 41 N	12.8	.09234	242	242.1 (234)	CJM
			Dec 32	12.2	28 42 E	12.3	80 41 N	12.2	.09221	242	242.1 (234)	CJM
			Jan 33	12.0	28 43 E	12.6	80 42 N	12.1	.09216	242	242.1(234)p	CJM
			Feb 33	10.8	28 39 E	10.9	80 41 N	10.9	.09216	242	242.1 (234)	CJM
			Mar 33	10.5	28 33 E	10.6	80 40 N	10.6	.09242	242	242.1 (234)	CJM
			Apr 33	11.4	28 47 E	11.5	80 41 N	11.5	.09216	242	242.1 (234)	CJM
			May 33	10.4	28 52 E	10.5	80 41 N	10.5	.09228	242	242.1 (234)	CJM
			Jun 33	10.6	28 43 E	10.8	80 41 N	10.8	.09209	242	242.1 (234)	CJM
			Jul 33	11.6	28 44 E	11.7	80 40 N	11.6	.09236	242	242.1 (234)	CJM
			Aug 7, 33	11.2	29 01 E	11.2	80 41 N	11.2	.09213	242	242.1 (234)	CJM
College, Absolute Observatory°	64 51.4 N	212 11	Jul '41	13.7	29 53 E	10.7	76 56 N	12.8	.12564	25	EI 25	EHB
			Aug 41	14.0	29 50 E	13.5	77 12 N	14.4	.12581	25	EI 25	B-S
			Sep 41	12.8	29 54 E	13.0	77 13 N	13.1	.12577	25	EI 25	B-S
			Oct 41	13.6	29 54 E	13.5	77 12 N	13.7	.12579	25	EI 25	B,S,St
			Nov 41	13.1	29 48 E	13.0	77 12 N	16.0	.12595	25	EI 25	B,St,W
			Dec 41	11.1	29 55 E	11.8	77 12 N	11.4	.12591	25	EI 25	B,S,W
			Jan 42	11.8	29 54 E	11.8	77 10 N	12.6	.12601	25	EI 25	B-W
			Feb 42	9.6	29 54 E	9.3	77 09 N	11.1	.12589	25	EI 25	B-St
			Mar 42	10.8	29 53 E	10.5	77 11 N	10.5	.12596	25	EI 25	B,S,W
			Apr 42	12.9	29 51 E	12.9	77 12 N	12.9	.12582	25	EI 25	B,S,W
			May 42	11.8	29 52 E	11.9	77 10 N	11.9	.12593	25	EI 25	B,S,W
			Jun 42	10.7	29 54 E	10.7	77 11 N	11.1	.12586	25	EI 25	B,S,W
			Jul 42	9.2	30 00 E	9.0	77 10 N	9.3	.12599	25	EI 25	B,S,W,O
			Aug 42	10.4	29 55 E	10.6	77 10 N	10.6	.12575	25	EI 25	B,S,W,O
			Sep 42	11.3	29 52 E	11.9	77 11 N	11.4	.12585	25	EI 25	B,S,W,O
			Oct 42	10.6	29 51 E	10.6	77 11 N	10.7	.12587	25	EI 25	B,S,W,O
			Nov 42	10.6	29 50 E	10.6	77 09 N	10.6	.12596	25	EI 25	B,S,W,O
			Dec 42	12.7	29 51 E	12.7	77 09 N	12.8	.12608	25	EI 25	B,S,W,O
			Jan 43	12.1	29 49 E	12.1	77 10 N	12.1	.12600	25	EI 25	B,S,W
			Feb 43	11.1	29 51 E	11.1	77 10 N	11.1	.12602	25	EI 25	B,S,W,O
			Mar 43	11.2	29 50 E	11.1	77 11 N	11.4	.12587	25	EI 25	B,S,W
			Apr 43	12.6	29 49 E	12.5	77 11 N	12.6	.12587	25	EI 25	B,W,O
			May 43	12.3	29 50 E	12.2	77 10 N	12.3	.12604	25	EI 25	S,W,O
			Jun 43	11.7	29 49 E	11.7	77 07 N	11.8	.12608	25	EI 25	S,W,O
			Jul 43	11.9	29 46 E	11.9	77 04 N	11.5	.12583	25	EI 25	W,O,M
			Aug 43	10.3	29 52 E	10.3	77 11 N	10.3	.12593	25	EI 25	W,O,M
			Sep 43	15.1	29 42 E	15.1	77 08 N	15.0	.12653	25	EI 25	C,M
			Oct 43	15.4	29 40 E	15.4	77 12 N	15.3	.12600	25	EI 25	C,M
			Nov 43	11.1	29 44 E	11.2	77 10 N	10.9	.12592	25	EI 25	C,M
			Dec 43	14.1	29 39 E	14.2	77 11 N	14.1	.12603	25	EI 25	C,M
			Jan 44	11.2	29 41 E	11.2	77 12 N	11.2	.12592	25	EI 25	C,M
			Feb 44	15.1	29 40 E	15.1	77 11 N	15.2	.12605	25	EI 25	C,M

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[o] Results are monthly mean values of weekly, or approximately weekly, absolute observations. [p] Extra set of inclination observations obtained on this month, using needles 5 and 6 of circle 172, and 8 of circle 202.

NORTH AMERICA

Alaska--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
College, Absolute Obs'y--concluded	64 51.4 N	212 11	Mar '44	14.4	29 41 E	14.5	77 11 N	14.5	.12606	25	EI 25	CM
			Apr 44	13.5	29 44 E	13.7	77 11 N	13.5	.12609	25	EI 25	CM
			May 44	13.8	29 42 E	13.9	77 12 N	13.4	.12607	25	EI 25	CM
			Jun 44	8.6	29 53 E	8.6	77 10 N	8.6	.12614	25	EI 25	W-M
			Jul 44	9.5	29 51 E	9.6	77 10 N	9.6	.12596	25	EI 25	W-M
			Aug 44	13.1	29 42 E	12.7	77 10 N	12.7	.12610	25	EI 25	W-M
			Sep 44	13.6	29 42 E	13.6	77 10 N	13.6	.12604	25	EI 25	W-M
			Oct 44	12.7	29 42 E	12.7	77 10 N	12.6	.12606	25	EI 25	W-M
			Nov 44	12.5	29 42 E	12.6	77 10 N	12.6	.12614	25	EI 25	W-M
			Dec 44	12.1	29 40 E	12.2	77 11 N	12.5	.12600	25	EI 25	W-M
Attu Island	52 55.8 N	173 14	Jul 15, 34	11.2, 12.4	2 55.1 E	16.6, 17.5	64 20 N	11.9-13.9	.21383	150	127.12	JCW

Canada

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Dundas Harbor (Devon Is.), A	74 34.0 N	277 30	Aug 26, '41	9.0, 16.3	97 37.9 W	14.2, 15.5[n]	87 08.4 N	15.0	.02933[q]	16	DC 222	FRG
			Aug 27, 41	....	....	10.0, 17.3	87 02.4 N	....	....	...	EI 16	FRG
Dundas Harbor, B	74 34.0 N	277 30	Aug 27, '41	....	....	....	....	14.4	.03163	16	....	FRG
Pond Inlet (Baffin Is.)	72 42.3 N	281 59	Aug 31, 41	9.0, 18.9	82 49.9 W	16.2, 18.4	86 24.4 N	13.6	.03510	16	EI 16	FRG
Clyde River (Baffin Is.)	70 27.9 N	291 25	Sep 5, '41	9.8, 14.3	63 14.4 W	13.6	84 33.5 N	10.8	.05392	16	EI 16	FRG
Fiord north of Cape Searle (Baffin Is.)	67 40.8 N	295 24	Sep 9, 41	10.8, 15.4	59 06.9 W	....	....	16.0	.06746[g]	16	....	FRG
			Sep 10, 41	....	....	8.8	83 14.3 N	....	....	...	EI 16	FRG
Pangnirtung (Baffin Is.)	66 0.5 N	294 25	Sep 14, 41	16.4	56 07.8 W	....	....	....	....	16	....	FRG
			Sep 15, 41	8.9, 16.5	55 16.0 W	15.9	83 33.3 N	10.3	.06512	16	EI 16	FRG
			Sep 16, 41	11.0	55 46.8 W	....	....	....	....	16	....	FRG
Grinnel River (Baffin Is.)	63 44.9 N	291 35	Oct 2, 43	13.1, 14.7	46 58.2 W	13.8, 14.0	83 31.0 N	....	....	16	EI 16	RGF
			Oct 3, 43	....	....	....	....	9.9, 11.0	.06978	16	....	RGF
York Sound (Baffin Is.)	62 25.9 N	293 30	Sep 21, 41	16.3	51 10.3 W	....	....	17.0	.08192[g]	16	....	FRG
			Sep 22, 41	9.5	51 15.2 W	8.8	81 51.6 N	10.2	.08138	16	EI 16	FRG
Payne Bay	60 00.8 N	289 54	Oct 9, 43	16.2	45 12.2 W	17.4	82 13.6 N	16.7	.07834[g]	16	EI 16	RGF
Fort Chimo	58 06.4 N	291 36	Oct 6, 43	9.3,[n] 9.7	40 08.4 W	10.7	80 53.4 N	9.0	.09216	16	EI 16	RGF
Agincourt Observatory	43 47 N	280 44	Dec 19, 33	10.9 to 13.9 (12)	7 39.1 W	....	....	15.0	.15446	16	....	JWG
			Dec 20, 33	....	....	....	....	9.9-14.9	.15425	16	....	JWG
			Dec 21, 33	....	....	14.1 to 17.3 (10)	74 48.0 N	10.4-12.3	.15420	16	EI 16	JWG
			Dec 22, 33	....	....	10.8, 11.0	74 48.7 N	....	....	...	EI 16	JWG

[g] From deflections at one distance only. [n] From deflections. [q] Observations with compass dip circle 222.

NORTH AMERICA

Central America

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Puerto Barrios	15 45.3 N	271 24	Apr 17, '39	13.9, 14.1	7 02.9 E	11.8, 12.4	44 42.3 N	14.6, 15.7	.30978	27	EI 27	AGM
Coban	15 29 N	269 42	Apr 14, 39	11.8, 18.5	7 51.6 E	16.1, 17.1	44 00.4 N	12.6, 18.0	.31246	27	EI 27	AGM
Huehuetenango	15 19.4 N	268 36	Apr 4, 39	9.8, 17.4	8 21.5 E	13.3, 13.7	43 17.6 N	10.8, 16.8	.31250	27	EI 27	AGM
Salamá	15 05.6 N	269 46	Apr 15, 39	10.0, 13.8	7 54.3 E	13.2, 13.4	43 17.3 N	10.7, 11.7	.31446	27	EI 27	AGM
Zacapa	14 59.3 N	270 30	Apr 16, 39	10.7, 14.2	7 46.6 E	14.0, 14.5	43 23.8 N	11.2, 15.6	.31374	27	EI 27	AGM
San Marcos	14 58 N	268 16	Apr 5, 39	13.2, 16.2	7 55.2 E	17.0, 17.3	42 26.8 N	14.1, 15.6	.31316	27	EI 27	AGM
Chichicastenango	14 56.6 N	268 54	Apr 9, 39	10.0, 12.6	8 02.1 E	13.3, 13.7	42 31.8 N	10.5, 11.6	.31425	27	EI 27	AGM
Quezaltenango, A	14 49.8 N	268 29	Apr 2, 39	11.8, 16.6	7 41.2 E	....	....	15.6	.31367	27	....	AGM
			Apr 3, 39	....	....	11.7, 12.7	42 03.0 N	9.8	.31402	27	EI 27	AGM
Quezaltenango, B	14 49.8 N	268 29	Feb 22, 40	9.8, 14.2	7 58.0 E	12.6, 14.8	42 01.5 N	10.4, 13.8	.31425	27	EI 27	JWG
			Feb 22, 40	15.3, 16.6	7 58.0 E	....	....	15.6, 16.3	.31402	27	....	JWG
			Feb 23, 40	....	....	15.4, 15.6	42 02.4 N	....	....	...	EI 27	JWG
			Feb 24, 40	10.5	7 57.9 E	....	....	11.2	.31410	27	....	JWG
Guatamala City, B	14 37.9 N	269 30	Apr 11, 39	11.8, 14.0	7 48.0 E	10.6, 11.1	42 44.8 N	12.4, 13.6	.31228	27	EI 27	AGM
Guatemala City, C	14 34.5 N	269 28	Apr 11, 39	16.9, 17.1	8 19.7 E	....	....	....	....	27	....	AGM
			Apr 12, 39	....	....	11.6, 12.0	42 31.1 N	12.7, 13.6	.31169	27	EI 27	AGM
Guatemala City (Base)	14 33.9 N	269 30	Mar 20, 40	10.7, 15.7	7 51.2 E	13.0, 13.4	42 33.6 N	10.7, 15.7	.31416	27	EI 27	JWG
Retalhulen	14 32.4 N	268 16	Feb 16, 39	13.7	8 10.0 E	....	....	14.7	.31491	27	....	AGM
			Feb 17, 39	13.8	8 09.8 E	10.8, 11.2	42 33.3 N	11.8	.31511	27	EI 27	AGM
Champerico	14 19 N	268 04	Apr 7, 39	11.6, 12.7	8 30.9 E	10.9, 11.2	41 49.4 N	12.5, 14.0	.31610	27	EI 27	AGM
Corinto, B	12 29.1 N	272 49	May 16, 31	12.6, 13.7	7 08.0 E	11.4, 11.5	40 22.8 N	13.0, 13.4	.31808	16	EI 16	REG
Granada	11 56.7 N	274 00	May 9, 31	10.3, 13.5	7 19.5 E	11.5, 11.6	39 47.6 N	10.7, 13.2	.31603	16	EI 16	REG
Uvita Island	10 00.1 N	277 00	Apr 19, 31	9.2, 11.1	4 08.3 E	11.8, 12.0	37 43.6 N	9.8, 10.7	.32139	16	EI 16	REG
Puntarenas	9 58.7 N	275 10	Feb 27, 34	11.8, 13.0	6 52.6 E	16.5	37 24.4 N	12.3, 15.2	.3167	150	127. 12	JCW
San Josè, B	9 57.6 N	275 54	Apr 26, 31	10.2, 13.2	6 35.1 E	11.4, 11.6	37 19.7 N	10.7, 12.7	.31960	16	EI 16	REG
			Mar 6, 34	11.2, 12.1	6 21.6 E	14.9, 15.8	37 42.4 N	11.7, 13.2	.3163	150	127 12	JCW
San Josè, A	9 57.2 N	275 56	Apr 23, 31	7.0, 9.4	6 30.8 E	12.3, 12.5	37 37.3 N	7.7, 8.8	.31830	16	EI 16	REG
San Josè, D	9 57.0 N	275 52	Apr 28, 31	10.3, 14.5	6 13.0 E	12.6, 12.8	37 17.9 N	10.9, 13.7	.31928	16	EI 16	REG
			Apr 29, 31	6.3, 13.9, 16.6	6 12.7 E	....	....	6.7-18.1	.31953	16	....	REG
			Apr 29, 31	6.7 to 18.1 (dv)	6 13.4 E	....	....	....	....	16	....	REG
			May 1, 31	....	....	6.3 to 18.0 (dv)	37 17.2 N	....	....	...	EI 16	REG
			Mar 7, 34	10.6, 11.5	6 17.4 E	14.2, 15.0	37 38.0 N	11.0, 13.1	.3180	150	127.12	JCW
Colon, Washington Hotel	9 22.0 N	280 05	Jun 11, 32	11.0, 13.3	5 09.0 E	12.5, 14.2	38 22.6 N	11.1, 13.3	.31325	26	EI 26	JWG
Colon, Sweetwater	9 21.3 N	280 03	Jun 10, 32	10.8, 13.6	5 19.3 E	12.4, 14.7	38 24.2 N	10.8, 13.6	.31204	26	EI 26	JWG
Telvers Island	9 19.6 N	280 02	Apr 24, 35	16.2, 16.7, 17.3	4 59.1 E	18.1	38 50.2 N	17.0	.31262	21	241.1	EHB
Old Panama, A	9 00.2 N	280 31	Jun 8, 32	10.2, 13.1	5 26.9 E	11.5, 11.7	38 08.0 N	10.2, 13.0	.31278	26	EI 26	JWG
Corozal, B	8 58.4 N	280 26	Jun 7, 32	10.8, 15.3	4 38.9 E	12.7, 13.7	38 04.9 N	10.9, 15.3	.31304	26	EI 26	JWG
Antoine Point	8 18 N	279 44	May 18, 28	15.2, 15.9	5 21.4 E	....	....	15.9, 16.3	.30980	156	....	RFS
			May 19, 28	14.1, 14.9	5 22.0 E	....	....	14.8, 15.2	.30966	156	....	RFS
			May 20, 28	13.4, 14.0	5 21.6 E	....	....	14.0, 14.4	.30999	156	....	RFS
			May 23, 28	....	....	14.8, 15.3	37 10 N[r]	....	....	...	EI 172	RFS
			May 27, 28	....	....	14.6, 15.2	37 08 N[r]	....	....	...	EI 172	RFS

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[r] Approximate value; reduction to standard not known.

NORTH AMERICA

Central America--concluded

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Antoine Point--concluded	8 18 N	279 44	May 25, '28	....	....	6.5 to 16.6 (dv)	37 10 N[r]	....	....	...	EI 172	RFS
Puerto Armvelles	8 16.1 N	277 08	May 30, 28	6.6 to 16.6 (dv)	5 22 E	....	....	6.6-16.6	.30974	156	....	RFS
			Feb 11, 34	9.7, 10.8	6 35.8 E	16.9, 17.1	35 39.0 N	10.3, 12.6	.3187	150	127.12	JCW
			Feb 12, 34	13.4, 13.8	6 35.8 E	10.5, 11.9	35 35.9 N	14.3, 16.0	.3185	150	127.12	JCW

Greenland

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Etah	78 19.5 N	287 20	Aug 15, '41	14.0	92 51.8 W	18.3	86 12.5 N	15.1	.03746[g]	16	EI 16	FRG
			Aug 16, 41	8.0, 14.4	94 07.0 W	12.0, 12.3	86 13.7 N	9.2, 13.7	.03625[g]	16	EI 16	FRG
			Aug 18, 41	9.5, 14.7	93 04.2 W	12.8, 13.2	86 15.9 N	10.3, 14.1	.03636[g]	16	EI 16	FRG
Etah (Reindeer P'nt)[o,s]	78 19.5 N	287 20	Oct 37	14.3	97 21.9 W	13.5	85 59.6 N	13.4	.03944	222-242	222.12(7)	RGF
			Nov 37	12.4	97 41.3 W	14.5	85 56.3 N	14.5	.03902	222	222.12(7)	
										242	242.56(1)	RGF
			Dec 37	15.4	97 05.8 W	15.5	86 02.8 N	15.5	.03898	222	222.12(7)	RGF
			Jan 38	16.3	96 49.6 W	16.4	85 59.8 N	16.4	.03906	222	222.12(7)	RGF
			Feb 38	16.5	97 02.3 W	16.5	85 56.3 N	16.5	.03964	222	222.1256(7)	RGF
			Mar 38	17.7	97 29.4 W	16.6	85 56.6 N	16.5	.03962	222	222.1256(7)	RGF
			Apr 38	15.4	98 07.3 W	16.7	85 57.9 N	16.7	.03938	222	222.56(7)	RGF
										242	242.1(2)(3)	CJM
			May 38	13.4	96 51.8 W	18.3	85 57.9 N	18.2	.03936	222	222.56(7)	RGF-CJM
			Jun 38	7.7	96 05.5 W	6.4	85 59.3 N	6.4	.03898	222	222.1256(7)	RGF
Thule	76 34.3 N	291 11	Aug 12, 41	13.4	79 22.7 W	17.3	85 27.4 N	14.3	.04505[g]	16	EI 16	FRG
Upernivik	72 47.4 N	303 48	Aug 8, 41	13.7	62 02.4 W	17.7	83 09.4 N	14.7	.06586	16	EI 16	FRG
Godhavn Observatory	69 15.0 N	306 28	Apr 41	....	54 50 W[t]	....	....	....	....	...	....	......
			May 41	....	...........[n]	....	81 34 N[t]	....	.08174[t]	...	....	......
Jakobshavn	69 13.3 N	308 53	Aug 12, 43	10.7, 13.2	53 49.4 W	15.2, 15.4	81 47.7 N	10.4, 13.6	.07914	16	EI 16	RGF
Egedesminde	68 42.5 N	307 07	Aug 11, 43	11.3, 14.6	53 22.4 W	15.5, 15.8	81 37.8 N	12.3, 13.8	.08069	16	EI 16	RGF
Agto	67 56.7 N	306 24	Aug 10, 43	11.2, 11.4	51 19.7 W	....	....	....	....	16	....	RGF
Sondrestrom Fiord 3	66 58.8 N	309 19	Aug 19, 43	9.8, 10.3	48 28.8 W	14.8, 15.1	80 38.2 N	11.1, 13.2	.08844	16	EI 16	RGF
Holstensborg	66 55.9 N	306 22	Aug 15, 43	....	....	16.0	82 09.0 N	14.7	.07856	16	EI 16	RGF
Kugssuak, Sondrestrom Fiord 2	66 44.8 N	308 24	Aug 17, 43	17.2	49 43.8 W	....	....	....	....	C-D11[u]	....	RGF
Cruncher Is., Sondrestrom Fiord 1	66 01.5 N	306 27	Aug 8, 43	11.2, 11.8	40 32.4 W	....	....	....	....	16	....	RGF
Angmagssalik Fiord	65 56.3 N	322 14	Aug 23, 43	13.0, 15.9	41 08.1 W	10.8, 11.2	78 21.2 N	14.6, 15.4	.10710	16	EI 16	RGF
Angmagssalik	65 36.7 N	322 22	Aug 24, 43	14.9, 15.7	38 15.0 W	....	....	....	....	C-D11	....	RGF
Sukkertoppen	65 24.6 N	307 07	Aug 6, 43	11.3	49 04.0 W	15.2	80 24.2 N	12.9, 14.0	.09390	16	EI 16	RGF

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[g] From deflections at one distance only. [n] From deflections. [o] Results are monthly mean values of weekly, or approximately weekly, absolute observations. [r] Approximate value; reduction to standard not known. [s] Observatory of C. J. McGregor Arctic Expedition, 1937-1938. [t] Mean value from observatory record for the month indicated. [u] Coast and Geodetic Survey compass declinometer 11.

NORTH AMERICA

Greenland--concluded

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Comanche Bay	65 03.8 N	319 41	Aug 26, '43	16.3, 16.6	40 54.4 W	....	....	....	....	16	....	RGF
			Aug 27, 43	9.1, 11.2	40 51.6 W	16.0, 16.2	78 33.0 N	9.7, 10.6	.10452	16	EI 16	RGF
			Aug 28, 43	....	....	....	....	14.4, 15.4	.10616	16	....	RGF
Atangmik	64 47.8 N	307 49	Aug 5, 43	15.2	44 26.1 W	....	....	....	....	16	....	RGF
Kapasigdlit	64 25.7 N	309 44	Aug 4, 43	....	....	14.6, 14.8	79 49.8 N	11.6, 12.2	.09754	16	EI 16	RGF
Godthaab	64 11.6 N	308 15	Jul 30, 41	11.3	47 03.3 W	13.6	79 18.4 N	12.5	.10194[e]	16	EI 16	FRG
	64 10.4 N	308 14	Aug 2, 43	6.6 to 18.0 (dv)	46 57.9 W	....	....	....	....	16	....	RFG
Faeringerhavn	63 41.2 N	308 17	Jul 30, 43	11.7	46 31.5 W	....	....	....	....	C-D11	....	RGF
Marrak	63 26.3 N	308 46	Jul 29, 43	10.3	44 39.5 W	....	....	....	....	C-D11	....	RGF
Fiskenaes	63 05.3 N	309 18	Jul 28, 43	12.6, 12.9	44 13.4 W	14.1	79 22.6 N	10.7, 11.9	.10171	16	EI 16	RGF
Frederikshaab Glacier	62 28.4 N	309 39	Jul 27, 43	10.1	45 17.2 W	....	....	....	....	C-D11	....	RGF
Frederikshaab	61 59.7 N	310 20	Jul 26, 43	15.4, 15.6	45 42.9 W	18.5, 18.8	78 36.0 N	16.5, 17.5	.10750	16	EI 16	RGF
Narsalik	61 38.4 N	310 41	Jul 25, 43	13.2, 13.7	42 08.3 W	....	....	....	....	C-D11	....	RGF
Narsarssuak	61 12.4 N	314 34	Jul 21, 41	11.0	40 08.6 W	14.0	79 57 N[v]	12.2	.10622[g]	16	EI 16	FRG
Ivigtut	61 12.1 N	311 50	Jul 22, 43	11.3, 11.5	39 45.4 W	15.8, 16.2	77 58.7 N	12.7, 13.8	.11186	16	EI 16	RGF
Ilivilik Fiord	60 48.5 N	317 11	Sep 15, 43	16.0	38 44.0 W	17.7	76 55.8 N	16.6	.12169	16	EI 16	RGF
Julianehaab	60 43 N	313 59	Jul 18, 41	....	....	17.2	77 47.1 N	15.8	.11515[g]	16	EI 16	FRG
			Jul 18, 43	17.8, 17.9	40 28.4 W	....	....	....	....	C-D11	....	RGF
Nanortalik	60 08.3 N	314 43	Sep 11, 43	14.8	38 56.5 W	16.9	76 57.0 N	15.5	.12097	16	EI 16	RGF
Prince Christian Sound	60 02.1 N	316 50	Sep 13, 43	13.4, 14.9	38 11.4 W	16.6	76 45.1 N	14.2	.12165	16	EI 16	RGF
Frederiksdahl	59 59.8 N	315 20	Sep 12, 43	10.4	38 41.0 W	....	....	....	....	C-D11	....	RGF
Sangmissok	59 59.7 N	316 06	Jul 13, 41	11.6	59 12.9 W	15.2	77 02.3 N	13.7	.12003[g]	16	EI 16	FRG

Labrador

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	°	h h	c.g.s.			
Hebron	58 12.6 N	297 21	Oct 18, '43	10.4	38 38 W[w]	13.6, 14.2	79 50.2 N	9.8, 10.9	.09975	16	EI 16	RGF
Nain	56 32.8 N	298 19	Oct 20, 43	14.8	39 40.1 W	16.5	76 49.4 N	15.5	.12862	16	EI 16	RGF
Hopedale	55 27.2 N	299 44	Oct 1, 41	13.7	36 53.5 W	15.6	78 07.0 N	14.3	.11660[g]	16	EI 16	FRG
Hopedale	55 27.1 N	299 48	Oct 22, 43	16.1, 16.3	37 07.8 W	....	....	....	....	C-D11	....	RGF
Long Tickle	55 01.0 N	301 12	Oct 24, 43	19.6, 19.8	36 29.6 W	....	....	....	....	16	....	RGF
Goose Bay	53 18.8 N	299 34	Oct 31, 43	19.0	33 12.4 W	....	....	....	....	16	....	RGF
Battle Harbor	52 16.7 N	304 24	Oct 7, 41	9.1, 15.9	33 12.9 W	13.5, 14.2	75 25.6 N	10.3, 15.2	.13652	16	EI 16	FRG

Newfoundland

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
St. Johns, C	47 34.4 N	307 16	Jul 2, '41	11.2	29 04.4 W	13.7	72 36.3 N	12.4	.15970	16	EI 16	FRG
St. Johns, E	47 33.8 N	307 20	Jul 1, 41	14.2	29 12.6 W	17.0	72 29.0 N	15.4	.16121[e]	16	EI 16	FRG

[e] From oscillations only. [g] From deflections at one distance only. [v] Results doubtful because of accidental displacement of tripod leg. [w] Value approximate owing to error in reading mark.

NORTH AMERICA

United States

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Dawsonville	39 08.4 N	282 38	Sep 1,'30	15.0	6 00.6 W	....	....	....	....	26	....	PGL
Washington, S.M.O., Nm	38 57.4 N	282 56	Jun 9-10, 27	10.1-15.4 (6)	5 17.6 W	....	....	9.5-15.9	.18405	3	....	JWG
			Oct 11-12, 27	14.6, 14.7, 15.0	5 26.2 W	....	....	14.0-15.5	.18339	3	....	JWG
			Oct 12-13, 27	10.3-11.2 (4)	5 23.4 W	....	....	9.6-12.0	.18238[k]	3	....	JWG
			Feb 20, 28	....	....	....	....	10.9-13.9	.18300	3	....	JWG
			Feb 23, 28	14.2	5 23.8 W	....	....	....	....	3	....	JWG
			Feb 24, 28	9.1-15.8 (6)	5 18.5 W	....	....	9.6-15.5	.18320	3	....	JWG
			Mar 9, 28	12.0, 14.8, 15.2	5 20.9 W	....	....	13.2-15.7	.18333	3	....	HWF
			Mar 10, 28	10.6, 11.0, 12.8	5 15.8 W	....	....	10.0-12.3	.18318	3	....	HWF
			Mar 21, 28	11.7-16.0 (6)	5 23.4 W	....	....	....	....	3	....	HWF
			Mar 23, 28	10.2-12.4 (4)	5 15.7 W	....	....	....	....	3	....	JWG
			Mar 23, 28	13.6-15.6 (8)	5 23.4 W	....	....	....	....	3	....	JWG
			Apr 2, 28	....	....	....	....	14.4-16.1	.18350	3	....	JWG
			Apr 3, 28	....	....	....	....	8.9-16.2	.18313	3	....	JWG
			Apr 4, 28	....	....	....	....	9.2-15.9	.18305	3	....	JWG
			Jul 12-13, 28	....	....	....	....	11.7-15.0	.18312	3	....	JWG
			Jul 14, 28	10.3-12.3 (8)	5 22.8 W	....	....	....	....	3	....	WFW
			Jul 16-17, 28	....	....	....	....	11.1-15.8	.18340	3	....	JWG
			Jul 16-17, 28	10.3-16.3 (5)	5 22.3 W	....	....	....	....	3	....	JWG
			Jul 25-26, 28	....	....	....	....	10.2-15.2	.18295	3	....	JWG
			Aug 6, 28	16.2	5 19.8 W	....	....	....	....	3	....	WFW
			Aug 7, 28	10.0	5 14.7 W	....	....	....	....	3	....	WFW
			Apr 30, May 1, 29	15.2, 15.6, 16.2	5 25.9 W	....	....	....	....	3	....	HWF
			May 1-2, 29	11.4, 11.8, 12.2	5 24.4 W	....	....	9.7-11.0	.18267	3	....	HWF
			May 1, 29	....	....	....	....	13.7, 14.8	.18288	3	....	HWF
			M'y 16-17, 29	13.9-16.1 (4)	5 24.6 W	....	....	13.9, 15.6	.18290	3	....	WFW
			M'y 16-18, 29	9.9, 10.7, 11.5	5 25.1 W	....	....	....	....	3	....	WFW
			M'y 16-18, 29	....	....	....	....	9.7-12.1	.18254	3	....	WFW
			M'y 19-20, 29	13.4-16.2 (4)	5 28.7 W	....	....	13.5-15.1	.18226	3	....	HFJ
			May 20, 30	11.2, 11.9	5 28.4 W	....	....	9.7, 10.8	.18182	3	....	HFJ
			Jul 10, 30	15.0, 15.8	5 30.8 W	....	....	....	....	3	....	WFW
			Jul 11, 30	11.0, 11.6	5 28.6 W	....	....	....	....	3	....	WFW
			Jul 12-15, 30	10.2, 11.2, 11.6	5 28.0 W	....	....	10.1-11.4	.18190	3	....	WFW
			Jul 14, 30	14.0	5 30.1 W	....	....	14.9	.18213	3	....	WFW
			Jul 24-25, 30	....	....	....	....	10.3-160	.18206	3	....	WFW
			Mar 19, 31	9.2-16.8 (6)	5 29.5 W	....	....	9.9-16.4	.18166	3	....	JWG
			Mar 27, 31	13.6, 15.5, 15.8	5 33.2 W	....	....	14.0-16.2	.18165	3	....	JWG
			Mar 28, 31	9.9, 10.4, 12.3	5 28.8 W	....	....	9.5-11.9	.18156	3	....	JWG
			M'r 30-31, 31	....	....	....	....	14.3, 10.9	.18164	3	....	WFW
			May 15, 31	14.1, 14.4, 15.0	5 33.8 W	....	....	11.8-15.5	.18166	3	....	JWG
			May 16, 31	9.7, 10.2, 12.0	5 30.3 W	....	....	9.3-11.5	.18140	3	....	JWG
			M'y 25-26, 31	9.4-16.1 (6)	5 33.0 W	....	....	10.2-156	.18162	3	....	WFW
			Jun 5, 31	13.3, 15.3, 15.8	5 34.1 W	....	....	13.8, 14.8	.18177	3	....	FTD
			Jun 5-6, 31	9.9, 11.3, 12.0	5 31.1 W	....	....	9.7-11.5	.18138	3	....	FTD

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[k] Magnetic storm in progress.

NORTH AMERICA

United States--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Washington, S.M.O., Nm--concluded	38 57.4 N	282 56	Jul 8,'31	14.4, 15.0	5 33.8 W	....	....	13.8, 15.5	.18168	3	....	WFW
			Jul 8-9, 31	10.4, 10.6	5 29.0 W	....	....	11.3, 10.0	.18136	3	....	WFW
			Jul 16-17, 31	11.5, 12.0, 15.8	5 34.8 W	....	....	9.7-13.5	.18149	3	....	WFW
			Sep 16-17, 31	10.5, 10.6, 11.0	5 30.5 W	....	....	9.8-11.9	.18102	3	....	FTD
			Sep 16-17, 31	14.3, 14.6, 15.4	5 35.9 W	....	....	14.1-15.8	.18127	3	....	FTD
			Nov 4-6, 31	....	....	....	....	9.8-15.2	.18100	3	....	FTD
			Nov 6, 31	13.8, 14.2	5 33.2 W	....	....	....	....	3	....	FTD
			Nov 11, 31	11.9-15.0 (4)	5 35.6 W	....	....	....	....	3	....	FTD
			Jun 30, 32	13.9, 14.4, 15.0	5 39.7 W	....	....	....	....	3	....	WFW
			Jul 1-2, 32	10.1, 10.4	5 32.2 W	....	....	10.6-11.7	.18086	3	....	WFW
			Jul 1-2, 32	12.2-16.0 (4)	5 37.5 W	....	....	12.1-15.1	.18109	3	....	WFW
			Jul 6-7, 32	....	....	....	....	14.1-15.9	.18116	3	....	WFW
			Aug 3-4, 32	9.5-15.0 (6)	5 37.0 W	....	....	10.0-14.5	.18099	3	....	WFW
			Feb 15-16, 33	10.9-14.7 (6)	5 36.4 W	....	....	11.0-15.6	.18060	3	....	JWG
			Feb 20, 33	15.9, 16.1, 16.4	5 34.9 W	....	....	....	....	3	....	JWG
			Aug 28-29, 33	....	....	....	....	10.0-15.4	.18031	3	....	SEF
			Aug 30-31, 33	9.5, 15.1, 9.9	5 38.1 W	....	....	....	....	3	....	SEF
			Aug 31, Sep 1, 33	14.5, 13.8	5 40.2 W	....	....	....	....	3	....	SEF
			Sep 2, 33	9.0	5 31.4 W	....	....	....	....	3	....	SEF
			Sep 5, 33	....	....	....	....	12.2-15.5	.18057	3	....	SEF
			Sep 5-6, 33	....	....	....	....	10.1-11.7	.18016	3	....	SEF
			Sep 11, 33	14.3, 16.5	5 37.6 W	....	....	14.9, 16.0	.18020	3	....	JWG
			Sep 12, 33	9.6-15.8 (4)	5 37.4 W	....	....	10.1-15.4	.18011	3	....	SEF
			Nov 16-20, 33	10.6-16.1 (6)	5 37.7 W	....	....	11.1-15.8	.18026	16	....	JWG
			Dec 9, 33	12.0, 13.8, 14.7	5 41.5 W	....	....	....	....	16	....	WFW
			Nov 8-10, 34	11.6-16.2 (6)	5 37.6 W	....	....	9.6-14.8	.17957	3	....	WFW
			Nov 22-23, 34	....	....	....	....	....	....	...	....	......
			Nov 24-27, 34	12.4-15.6 (5)	5 37.6 W	....	....	....	....	3	....	WFW
			Nov 26-28, 34	9.3, 9.6	5 32.2 W	....	....	....	....	3	....	WFW
			Nov 23-28, 34	....	....	....	....	10.7-14.7	.17967	3	....	WFW
			Jun 12-13, 35	12.1, 14.9, 15.7	5 40.2 W	....	....	13.9-15.6	.17970	3	....	WFW
			Jun 13-14, 35	9.4, 11.4, 12.0	5 35.9 W	....	....	10.0-11.3	.17942	3	....	WFW
			Jun 21, 35	14.1, 14.7, 16.2	5 39.8 W	....	....	12.2, 15.5	.17958	3	....	WFW
			Jun 21-24, 35	9.3, 10.0, 11.0	5 34.4 W	....	....	10.0-11.9	.17935	3	....	WFW
			Jun 27-28, 35	13.6, 13.8, 15.1	5 39.8 W	....	....	14.4-15.9	.17988	3	....	WFW
			Jun 28-29, 35	9.2, 10.8, 11.3	5 35.4 W	....	....	10.0, 12.0	.17944	3	....	WFW
			Jul 3, 35	13.6, 13.9, 14.2	5 42.0 W	....	....	....	....	3	....	WFW
			Jan 9-10, 36	11.0, 15.4, 16.0	5 38.7 W	....	....	....	....	3	....	WFW
Washington, S.M.O., Sm	38 57.4 N	282 56	Mar 25, 27	10.4, 12.2	5 14.8 W	....	....	11.0, 11.6	.18364	3	....	HWF
			Apr 6-7, 27	14.0, 9.0	5 18.1 W	....	....	14.9, 16.4	.18374	3	....	HWF
			Jun 7-9, 27	9.5-11.8 (5)	5 18.0 W	....	....	9.6 (Jun 9)	.18385	3	....	JWG
			Jun 7-8, 27	12.1, 14.5, 15.0	5 20.4 W	....	....	12.1-15.6	.18410	3	....	JWG
			Oct 10-11, 27	10.4, 11.2, 11.4	5 18.3 W	....	....	9.8-12.1	.18316	3	....	JWG
			Oct 10-11, 27	14.0, 14.9, 15.5	5 21.3 W	....	....	13.6-16.0	.18341	3	....	JWG

NORTH AMERICA

United States--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Washington, S.M.O., Sm--continued	38 57.4 N	282 56	Feb 25-27, '28	9.4-11.4 (4)	5 15.8 W	....	....	9.8-12.4	.18308	3	....	JWG
			Feb 25-27, 28	12.4-12.8	5 20.7 W	....	....	....	....	3	....	JWG
			Mar 1, 28	10.9, 11.4, 11.6	5 19.8 W	....	....	....	....	3	....	HWF
			Mar 6-7, 28	11.3, 11.8, 12.2	5 22.0 W	....	....	10.1-12.7	.18313	3	....	HWF
			Mar 6-7, 28	14.8-16.2 (4)	5 23.4 W	....	....	13.6-14.6	.18329	3	....	HWF
			Jul 18, 28	9.2, 12.4	5 20.8 W	....	....	....	....	3	....	JWG
			Jul 18, 28	13.3, 15.8	5 25.2 W	....	....	10.2-15.3	.18313	3	....	JWG
			Aug 7, 28	10.8, 11.2	5 22.8 W	....	....	....	....	3	....	WFW
			Apr 29-30, 29	12.1-15.4 (4)	5 28.0 W	....	....	13.9-16.0	.18285	3	....	HWF
			Apr 30, 29	9.5, 9.8	5 18.6 W	....	....	10.5, 11.6	.18250	3	....	HWF
			M'y 20-21, 29	9.4, 10.9	5 23.7 W	....	....	10.0, 10.5	.18260	3	....	WFW
			M'y 20-21, 29	12.3-16.2 (5)	5 27.5 W	....	....	12.1-16.1	.18288	3	....	WFW
			M'y 16-19, 30	9.3-16.0 (6)	5 29.3 W	....	....	9.8-15.4	.18207	3	....	HFJ
			Jul 16-17, 30	10.2, 11.4	5 28.8 W	....	....	10.0, 11.0	.18157	3	....	WFW
			Jul 16-17, 30	12.9-16.2 (7)	5 31.9 W	....	....	13.1, 15.2	.18196	3	....	WFW
			Jul 22-23, 30	....	....	....	....	13.5-15.8	.18203	3	....	WFW
			Jul 23-24, 30	....	....	....	....	10.0-11.4	.18182	3	....	WFW
			Mar 20, 31	9.5, 11.2, 11.6	5 29.7 W	....	....	9.9-11.9	.18136	3	....	JWG
			Mar 20, 31	13.8-16.3 (4)	5 34.3 W	....	....	13.4-15.4	.18178	3	....	JWG
			Mar 31, Apr 1, 31	13.1, 14.6, 16.1	5 36.7 W	....	....	13.5-15.8	.18158	3	....	JWG
			Apr 1, 31	9.4, 9.6, 11.5	5 28.6 W	....	....	10.1, 11.1	.18140	3	....	JWG
			M'y 11-12, 31	11.0-16.5(6)	5 36.7 W	....	....	12.2-16.0	.18158	3	....	JWG
			M'y 14-15, 31	10.7, 11.8, 15.5	5 35.7 W	....	....	10.1-16.0	.18156	3	....	JWG
			M'y 26-27, 31	12.1-16.0 (7)	5 34.5 W	....	....	13.8-15.2	.18176	3	....	WFW
			May 27, 31	9.6	5 30.3 W	....	....	10.1, 11.2	.18142	3	....	WFW
			Jun 3-4, 31	10.0-15.9 (5)	5 33.3 W	....	....	9.5-14.6	.18156	3	....	FTD
			Jun 5, 31	9.2	5 27.0 W	....	....	....	....	3	....	FTD
			Jul 15-16, 31	12.2, 13.9, 15.8	5 34.3 W	....	....	10.0-14.4	.18127	3	....	WFW
			Sep 17-18, 31	14.9, 14.0, 14.4	5 37.3 W	....	....	13.5-15.4	.18125	3	....	FTD
			Sep 18-19, 31	10.3-11.0 (4)	5 32.2 W	....	....	9.6-11.4	.18104	3	....	FTD
			Nov 5, 31	....	....	....	....	11.7, 13.6	.18074	3	....	FTD
			Nov 6, 31	11.9-14.2 (4)	5 33.8 W	....	....	10.2	.18114	3	....	FTD
			Nov 11-12, 31	9.2-15.8 (4)	5 30.3 W	....	....	....	....	3	....	FTD
			Jun 24, 32	9.9, 10.6, 11.2	5 35.8 W	....	....	....	....	3	....	WFW
			Jun 29-30, 32	....	....	....	....	10.2-15.4	.18100	3	....	WFW
			Jul 15, 32	14.0, 16.0	5 37.7 W	....	....	14.4, 15.6	.18107	3	....	WFW
			Jul 16-18, 32	9.4-11.7 (4)	5 35.9 W	....	....	9.8-11.2	.18093	3	....	WFW
			Aug 2, 32	13.8, 15.9	5 40.7 W	....	....	14.4, 15.5	.18116	3	....	WFW
			Aug 2-3, 32	9.2-12.4 (4)	5 35.4 W	....	....	9.7-11.8	.18058	3	....	WFW
			Aug 22-23, 32	....	....	....	....	9.3-15.9	.18071	3	....	WFW
			Feb 16-30, 33	10.3-15.4 (7)	5 37.4 W	....	....	10.8-15.6	.18051	3	....	JWG
			Aug 22, 33	11.2, 11.8, 12.2	5 42.0 W	....	....	....	....	3	....	SEF
			Aug 24-25, 33	....	....	....	....	14.1-15.5	.18033	3	....	SEF
			Aug 25-26, 33	....	....	....	....	10.7-12.3	.18020	3	....	SEF
			Sep 6-7, 33	....	....	....	....	14.4-16.1	.18051	3	....	SEF
			Sep 7-8, 33	....	....	....	....	9.4-11.2	.18009	3	....	SEF

NORTH AMERICA

United States--continued

Station	Latitude	Long East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Washington, S.M.O., Sm--concluded	38 57.4 N	282 56	Sep 9,'33	8.6, 11.3, 14.5	5 40.8 W	....	....	....	....	3	....	SEF
			Sep 10, 33	10.1-17.2 (4)	5 39.6 W	....	....	10.8-16.8	.18001	3	....	SEF
			Sep 11, 33	10.2, 12.5	5 39.8 W	....	....	10.8-12.0	.17979	3	....	JWG
			Nov 13, 33	....	....	....	....	12.8, 14.3	.18001	16	....	JWG
			Nov 15-16, 33	....	....	....	....	11.6-15.5	.18015	16	....	JWG
			Nov 20, 33	14.4-15.9 (4)	5 39.8 W	....	....	....	....	16	....	JWG
			Nov 21, 33	10.1, 10.6	5 40.0 W	....	....	....	....	16	....	JWG
			Dec 12, 33	14.2, 14.7, 15.4	5 38.9 W	....	....	....	....	16	....	WFW
			Nov 6-8, 34	14.3-16.0 (5)	5 39.1 W	....	....	13.7-15.3	.17963	3	....	WFW
			Nov 7-8, 34	11.0, 11.3, 12.0	5 42.2 W	....	....	10.4, 11.6	.17950	3	....	WFW
			Nov 30, Dec 1, 34	10.0, 11.9, 13.0	5 39.4 W	....	....	10.9, 14.0	.17972	3	....	WFW
			Dec 3-4, 34	9.5, 9.9, 12.0	5 38.6 W	....	....	14.1-15.5	.17966	3	....	WFW
			Jun 10-11, 35	13.5-16.0 (5)	5 42.6 W	....	....	14.3-16.0	.17958	3	....	WFW
			Jun 11-12, 35	9.3, 10.6, 11.4	5 36.8 W	....	....	10.2-12.2	.17952	3	....	WFW
			Jun 24-25, 35	9.4-16.0 (6)	5 37.4 W	....	....	10.5-15.1	.17972	3	....	WFW
			Jun 26-27, 35	9.3, 9.3	5 31.7 W	....	....	10.3-11.5	.17943	3	....	WFW
			Jun 26-27, 35	12.1-15.8 (4)	5 42.5 W	....	....	14.1, 15.2	.17990	3	....	WFW
			Jul 3, 35	14.8, 15.1, 15.4	5 40.1 W	....	....	....	....	3	....	WFW
			Oct 14-15, 35	12.4, 14.9, 15.8	5 39.0 W	....	....	....	....	3	....	WFW
			Oct 15, 35	9.2-11.7 (4)	5 33.6 W	....	....	....	....	3	....	WFW
			Jan 10, 36	14.7, 15.1, 15.5	5 39.1 W	....	....	....	....	3	....	WFW
Washington, S.M.O., Em	38 57.4 N	282 56	M'r 25-28, 27	9.8-16.3 (4)	5 17.0 W	....	....	11.5-15.3	.18400	3	....	HWF
			Apr 5-6, 27	9.4-13.3 (4)	5 16.1 W	....	....	14.5, 16.2	.18402	3	....	F-W
			Mar 7-8, 28	12.1-16.2 (4)	5 23.2 W	....	....	....	....	3	....	HWF
			Mar 8-9, 28	11.6, 10.3	5 16.1 W	....	....	9.7-15.7	.18331	3	....	HWF
			Mar 13, 28	....	....	9.8-11.9(6)	71 19.8 N	....	....	...	EI 48	HWF
			M'r 21-23, 31	9.2-15.3 (6)	5 31.1 W	....	....	9.7-14.9	.18146	3	....	JWG
			M'y 21-22, 31	....	....	9.6-15.5(6)	71 22.5 N	....	....	...	EI 48	JWG
Washington, S.M.O., Ne	38 57.4 N	282 56	M'r 24-26, 27	....	....	10.6-14.6(3)	71 17.3 N	....	....	...	EI 48	HWF
			Jun 13, 27	....	....	11.0-14.8(6)	71 15.4 N	....	....	...	EI 48	JWG
			Oct 20, 27	....	....	9.4-11.7(6)	71 17.5 N	....	....	...	EI 48	JWG
			Dec 23, 27	....	....	14.4-15.8(5)	71 15.5 N	....	....	...	EI 48	HWF
			Dec 27, 27	....	....	11.2-13.4(5)	71 18.2 N	....	....	...	EI 48	HWF
			Dec 27, 27	....	....	13.9-15.5(5)	71 15.7 N	....	....	...	EI 48	HWF
			Dec 28, 27	....	....	10.7-13.6(6)	71 18.2 N	....	....	...	EI 48	HWF
			Dec 30, 27	....	....	9.4-10.6(4)	71 18.1 N	....	....	...	EI 48	HWF
			Feb 17-20, 28	....	....	9.9-15.9(8)	71 18.5 N	....	....	...	EI 48	JWG
			Feb 27, 28	....	....	14.1-16.1(6)	71 18.4 N	....	....	...	EI 48	JWG
			M'r 13-14, 28	....	....	9.8-15.6(6)	71 18.8 N	....	....	...	EI 48	HWF
			Mar 16, 28	....	....	13.5-15.6(6)	71 17.4 N	....	....	...	EI 48	HWF
			Jun 20-21, 28	....	....	10.2-15.9(7)	71 16.8 N	....	....	...	EI 48	K-W
			Jun 22, 28	....	....	9.4-11.1(3)	71 18.3 N	....	....	...	EI 48	WFW
			Jul 12, 28	....	....	14.3	71 19.2 N	....	....	...	EI 48	JWG
			Jul 13, 28	....	....	13.1	71 19.0 N	....	....	...	EI 48	JWG

NORTH AMERICA

United States--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r		
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Washington, S.M.O., Ne--continued	38 57.4 N	282 56	Jul 25-26,'28	....	....	10.2-15.2(8)	71 19.8 N	....	....	...	EI 48	JWG
			May 3-4, 29	....	....	9.5-16.3(6)	71 19.5 N	....	....	...	EI 48	HWF
			May 23, 29	....	....	11.1-15.4(6)	71 20.2 N	....	....	...	EI 48	WFW
			Mar 21, 30	....	....	10.1-14.2(6)	71 23.1 N	....	....	...	EI 48	HFJ
			Mar 24, 30	....	....	13.8-16.0(4)	71 21.7 N	....	....	...	EI 48	HFJ
			Mar 25, 30	....	....	9.3-12.0(6)	71 23.4 N	....	....	...	EI 48	HFJ
			May 21, 30	....	....	9.7-14.0(6)	71 22.4 N	....	....	...	EI 48	HFJ
			May 23, 30	....	....	10.4-13.9(6)	71 22.3 N	....	....	...	EI 48	HFJ
			Jul 17-19, 30	....	....	10.0-15.8(4)	71 21.7 N	....	....	...	EI 48	WFW
			Jul 24-25, 30	....	....	10.2-16.0(8)	71 21.6 N	....	....	...	EI 48	WFW
			M'r 19-21, 31	....	....	10.6-15.6(6)	71 23.4 N	....	....	...	EI 48	WFW
			Mar 23, 31	....	....	13.9-16.4(6)	71 22.1 N	....	....	...	EI 48	JWG
			Mar 25, 31	....	....	13.4-16.4(8)	71 23.0 N	....	....	...	EI 48	JWG
			Mar 26, 31	....	....	9.1-10.4(4)	71 23.0 N	....	....	...	EI 48	JWG
			M'r 30-31, 31	....	....	15.4, 11.8	71 22.6 N	....	....	...	EI 48	WFW
			M'y 19-20, 31	....	....	9.8-16.0(6)	71 22.7 N	....	....	...	EI 48	JWG
			Jun 1-2, 31	....	....	11.8-15.9(6)	71 22.1 N	....	....	...	EI 48	WFW
			Jun 10-25, 31	....	....	11.4-13.7(4)	71 22.0 N	....	....	...	EI 48	WFW
			Jul 13-14, 31	....	....	10.1-15.5(6)	71 20.9 N	....	....	...	EI 48	WFW
			Jul 14-15, 31	....	....	9.8-15.6(3)	71 22.9 N	....	....	...	EI 48	WFW
			Sep 21, 31	....	....	11.7-16.4(6)	71 23.7 N	....	....	...	EI 48	FTD
			Nov 2, 31	....	....	13.2-15.5(4)	71 24.0 N	....	....	...	EI 48	FTD
			Nov 3-4, 31	....	....	10.1-10.9(4)	71 23.8 N	....	....	...	EI 48	FTD
			Nov 4-6, 31	....	....	9.9-15.2(6)	71 24.3 N	....	....	...	EI 48	FTD
			Jun 24, 32	....	....	14.3-15.9(4)	71 23.1 N	....	....	...	EI 48	WFW
			Jun 25, 32	....	....	10.3-11.9(4)	71 24.4 N	....	....	...	EI 48	WFW
			Jun 29-30, 32	....	....	10.3-15.3(6)	71 23.9 N	....	....	...	EI 48	WFW
			Jul 19, 32	....	....	9.8-12.2(6)	71 25.2 N	....	....	...	EI 48	WFW
			Aug 1, 32	....	....	9.7-13.0(6)	71 25.0 N	....	....	...	EI 48	WFW
			Aug 8, 32	....	....	9.5-14.5(9)	71 25.2 N	....	....	...	EI 48	WFW
			Aug 22-23, 32	....	....	9.3-16.0(8)	71 25.4 N	....	....	...	EI 48	WFW
			Feb 21, 33	....	....	10.4-15.6(9)	71 26.4 N	....	....	...	EI 48	JWG
			Aug 28-29, 33	....	....	10.0-15.6(6)	71 26.4 N	....	....	...	EI 48	SEF
			Aug 30, 33	....	....	12.0-16.3(8)	71 25.7 N	....	....	...	EI 48	SEF
			Aug 31, 33	....	....	11.5-16.2(8)	71 25.9 N	....	....	...	EI 48	SEF
			Sep 1, 33	....	....	15.4	71 26.4 N	....	....	...	EI 48	SEF
			Sep 2, 33	....	....	10.7, 14.1	71 25.8 N	....	....	...	EI 48	SEF
			Sep 5-6, 33	....	....	10.1-15.6(6)	71 25.9 N	....	....	...	EI 48	SEF
			Sep 17, 33	....	....	12.3, 14.6	71 26.6 N	....	....	...	EI 48	SEF
			Sep 18, 33	....	....	10.0	71 27.9 N	....	....	...	EI 48	SEF
			Nov 24, 33	....	....	13.3, 15.2	71 27.7 N	....	....	...	EI 48	JWG
			Nov 25, 33	....	....	9.7	71 27.2 N	....	....	...	EI 48	JWG
			Nov 22, 34	....	....	16.2	71 27.2 N	....	....	...	EI 48	WFW
			Nov 23, 34	....	....	11.5, 13.6	71 27.9 N	....	....	...	EI 48	WFW
			Nov 24, 34	....	....	10.5	71 28.0 N	....	....	...	EI 48	WFW
			Nov 26, 34	....	....	11.1-15.7(3)	71 27.9 N	....	....	...	EI 48	WFW
			Nov 27, 34	....	....	10.7, 15.1	71 27.9 N	....	....	...	EI 48	WFW

NORTH AMERICA

United States--continued

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Washington, S.M.O., Ne--concluded	38 57.4 N	282 56	Nov 28,'34	....	....	10.7, 11.9	71 28.4 N	....	....	...	EI 48	WFW
			Dec 6-7, 34	....	....	10.0-14.3(6)	71 28.8 N	....	....	...	EI 48	WFW
			Jun 14-15, 35	....	....	15.9, 10.8	71 29.2 N	....	....	...	EI 48	WFW
			Jun 17, 35	....	....	10.4	71 29.4 N	....	....	...	EI 48	WFW
			Jun 20, 35	....	....	10.6-15.4(3)	71 29.1 N	....	....	...	EI 48	WFW
			Jun 21-24, 35	....	....	9.9-15.5(6)	71 29.6 N	....	....	...	EI 48	WFW
			Jun 27-28, 35	....	....	10.0-15.9(6)	71 28.4 N	....	....	...	EI 48	WFW
			Jun 29, 35	....	....	10.2, 11.9	71 29.9 N	....	....	...	EI 48	WFW
			Jul 1, 35	....	....	10.3-15.5(3)	71 29.3 N	....	....	...	EI 48	WFW
Washington, S.M.O., Se	38 57.4 N	282 56	Jun 13, 27	....	....	15.7, 16.1	71 14.4 N	....	....	...	EI 48	JWG
			Jun 14, 27	....	....	9.4-11.0(4)	71 17.0 N	....	....	...	EI 48	JWG
			Oct 19, 27	....	....	13.6-16.1(6)	71 16.9 N	....	....	...	EI 48	JWG
			Dec 19, 27	....	....	11.0-16.0(6)	71 18.5 N	....	....	...	EI 48	HWF
			Dec 20, 27	....	....	9.5-16.0(8)	71 18.1 N	....	....	...	EI 48	HWF
			Dec 21, 27	....	....	10.0-13.8(7)	71 18.2 N	....	....	...	EI 48	HWF
			Dec 21, 27	....	....	14.3-16.0(6)	71 17.0 N	....	....	...	EI 48	HWF
			Dec 22, 27	....	....	14.7-16.0(4)	71 16.5 N	....	....	...	EI 48	HWF
			Dec 23, 27	....	....	10.2-12.2(5)	71 18.5 N	....	....	...	EI 48	HWF
			Dec 30, 27	....	....	11.6-12.7(4)	71 19.6 N	....	....	...	EI 48	HWF
			Feb 28, 28	....	....	10.1-12.2(6)	71 18.2 N	....	....	...	EI 48	JWG
			Mar 12, 28	....	....	13.8-16.5(6)	71 18.1 N	....	....	...	EI 48	HWF
			Mar 17, 28	....	....	10.4-12.6(6)	71 19.6 N	....	....	...	EI 48	HWF
			M'r 26-27, 28	....	....	10.0-16.0(8)	71 18.8 N	....	....	...	EI 48	HWF
			Mar 29, 28	....	....	9.9-14.6(4)	71 18.1 N	....	....	...	EI 48	HWF
			M'r 30-31, 28	....	....	10.0-15.5(9)	71 18.3 N	....	....	...	EI 48	HWF
			Jun 19-20, 28	....	....	9.4-15.5(8)	71 17.5 N	....	....	...	EI 48	AHK
			May 2-3, 29	....	....	9.9-15.9(7)	71 18.6 N	....	....	...	EI 48	HWF
			May 4, 29	....	....	13.0-14.4(4)	71 18.0 N	....	....	...	EI 48	HWF
			M'y 22-23, 29	....	....	9.3-14.9(8)	71 20.2 N	....	....	...	EI 48	WFW
			May 24, 29	....	....	9.4-12.3(6)	71 21.5 N	....	....	...	EI 48	WFW
			M'r 19-20, 30	....	....	11.0-15.4(7)	71 23.2 N	....	....	...	EI 48	HFJ
			M'r 25-26, 30	....	....	9.6-15.9(8)	71 22.3 N	....	....	...	EI 48	HFJ
			M'y 21-22, 30	....	....	10.7-15.6(5)	71 21.7 N	....	....	...	EI 48	HFJ
			M'y 22-23, 30	....	....	9.3-15.9(5)	71 21.5 N	....	....	...	EI 48	HFJ
			Jul 21-22, 30	....	....	10.1-15.2(7)	71 21.9 N	....	....	...	EI 48	WFW
			Jul 23-24, 30	....	....	10.1-15.8(6)	71 22.1 N	....	....	...	EI 48	WFW
			Mar 24, 31	....	....	9.8-12.2(6)	71 23.5 N	....	....	...	EI 48	JWG
			Mar 24, 31	....	....	13.8-16.1(6)	71 22.9 N	....	....	...	EI 48	JWG
			Mar 25, 31	....	....	9.6-11.7(6)	71 23.5 N	....	....	...	EI 48	JWG
			May 22, 31	....	....	13.4-15.6(6)	71 22.6 N	....	....	...	EI 48	JWG
			Jun 1, 31	....	....	10.3-14.4(6)	71 21.7 N	....	....	...	EI 48	WFW
			Jun 25, 31	....	....	14.9, 15.8	71 21.3 N	....	....	...	EI 48	FTD
			Jul 1, 31	....	....	11.1-14.2(4)	71 20.8 N	....	....	...	EI 48	WFW
			Jul 10, 31	....	....	10.5-15.4(6)	71 21.0 N	....	....	...	EI 48	WFW
			Jul 11-13, 31	....	....	10.1-12.5(6)	71 22.6 N	....	....	...	EI 48	WFW
			Jul 15, 31	....	....	11.6-14.3(3)	71 23.4 N	....	....	...	EI 48	WFW

NORTH AMERICA

United States--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Washington, S.M.O., Se--concluded	38 57.4 N	282 56	Sep 22,'31	....	....	9.8-13.3(6)	71 23.2 N	....	....	...	EI 48	FTD
			Nov 3, 31	....	....	12.2-15.2(6)	71 24.4 N	....	....	...	EI 48	FTD
			Jul 5, 32	....	....	10.5-14.6(8)	71 23.1 N	....	....	...	EI 48	WFW
			Jul 6-7, 32	....	....	14.4-15.7(4)	71 23.3 N	....	....	...	EI 48	WFW
			Jul 11, 32	....	....	9.8-12.9(6)	71 25.2 N	....	....	...	EI 48	WFW
			Jul 18, 32	....	....	13.4-15.7(6)	71 23.8 N	....	....	...	EI 48	WFW
			Aug 1, 32	....	....	14.5-15.9(4)	71 23.4 N	....	....	...	EI 48	WFW
			Aug 5-6, 32	....	....	9.6-12.6(6)	71 25.6 N	....	....	...	EI 48	WFW
			Aug 8, 32	....	....	15.2-16.1(3)	71 23.3 N	....	....	...	EI 48	WFW
			Feb 23-24, 33	....	....	10.4-12.3(5)	71 27.2 N	....	....	...	EI 48	JWG
			Feb 23, 33	....	....	13.5-15.5(6)	71 26.8 N	....	....	...	EI 48	JWG
			Aug 22-23, 33	....	....	10.5-16.0(8)	71 26.4 N	....	....	...	EI 48	SEF
			Aug 23-24, 33	....	....	10.2-14.5(5)	71 26.7 N	....	....	...	EI 48	SEF
			Aug 24-26, 33	....	....	10.8-15.6(6)	71 26.6 N	....	....	...	EI 48	SEF
			Sep 6-8, 33	....	....	10.0-15.0(6)	71 26.5 N	....	....	...	EI 48	SEF
			Sep 9, 33	....	....	10.3-15.6(3)	71 29.7 N	....	....	...	EI 48	SEF
			Sep 16-17, 33	....	....	9.7-15.8(3)	71 28.5 N	....	....	...	EI 48	J-F
			Nov 23, 33	....	....	11.4-14.5(8)	71 28.1 N	....	....	...	EI 16	JWG
			Nov 24, 33	....	....	10.9	71 28.6 N	....	....	...	EI 16	JWG
			Nov 30, Dec 1, 34	....	....	10.2-14.0(3)	71 28.1 N	....	....	...	EI 48	WFW
			Dec 3, 34	....	....	11.5-15.5(3)	71 27.9 N	....	....	...	EI 48	WFW
			Dec 4, 34	....	....	10.7-15.2(3)	71 29.6 N	....	....	...	EI 48	WFW
			Dec 5-6, 34	....	....	10.1-16.1(6)	71 28.6 N	....	....	...	EI 48	WFW
			Jun 17-18, 35	....	....	10.5-14.6(3)	71 28.7 N	....	....	...	EI 48	WFW
			Jun 19, 35	....	....	10.4-15.7(3)	71 29.0 N	....	....	...	EI 48	WFW
			Jun 23-25, 35	....	....	10.5-15.0(6)	71 27.8 N	....	....	...	EI 48	WFW
			Jun 26-27, 35	....	....	10.2-15.1(6)	71 28.7 N	....	....	...	EI 48	WFW
			Jul 2-3, 35	....	....	9.8-14.9(4)	71 29.0 N	....	....	...	EI 48	WFW
Cheltenham, Pier 1	38 44.0 N	283 10	Sep 20, 33	....	....	11.0-16.2(8)	71 14.3 N	....	....	...	EI 48	JWG
			Sep 27, 33	13.0-15.0 (6)	7 10.4 W	....	....	....	....	3	....	JWG
			Sep 28, 33	13.3-15.5 (8)	7 08.7 W	....	....	....	....	3	....	JWG
			Oct 2-3, 33	10.1-16.2 (6)	7 09.4 W	....	....	10.6-15.5	.18402	3	....	JWG
			Oct 5, 33	....	....	13.9-16.4(7)	71 14.3 N	....	....	...	EI 48	JWG
			Oct 17-18, 33	9.0-15.9 (6)	7 09.7 W	....	....	9.5-15.3	.18387	3	....	JWG
			Oct 20, 33	....	....	9.2-11.1(6)	71 16.2 N	....	....	...	EI 48	JWG
			Aug 8, 35	13.4, 15.7	7 08.8 W	10.4-12.0(6)	71 16.6 N	14.2, 15.2	.18364	18	EI 18	RHM
			Aug 9, 35	10.2-16.4 (6)	7 10.1 W	....	....	10.6-15.9	.18337	18	....	RHM
			Aug 12, 35	10.4-14.7 (4)	7 12.3 W	15.3-16.6(6)	71 16.2 N	10.9-14.2	.18350	18	EI 18	RHM
			Oct 11, 35	....	....	....	....	11.2-12.1	.18299	S-G1	....	G-J
			Nov 20-22, 35	9.5-13.3 (6)	7 07.1 W	....	....	....	....	28	....	WFW
			Nov 22, 35	....	....	13.9-15.4(6)	71 18.2 N	....	....	...	EI 28	WFW
			Sep 10, 36	13.2-14.4 (5)	7 12.3 W	....	....	....	....	13	....	WFW
			Sep 10, 36	14.7-16.2 (5)	7 09.1 W	....	....	....	....	13	....	WFW
			Oct 1-2, 36	9.9-16.0 (8)	7 08.0 W	15.8-17.0(3)	71 18.0 N	....	....	13	EI 48	WFW
			Jan 21-22, 37	....	....	10.7-16.2(7)	71 20.7 N	....	....	...	EI 48	SEF
			Jan 26, 37	10.2-12.0 (6)	7 04.8 W	....	....	....	....	3	....	SEF

NORTH AMERICA

United States--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Cheltenham, Pier 1 --concluded	38 44.0 N	283 10	Feb 26,'37	....	....	14.3-16.8(4)	71 19.3 N	....	....	...	EI 48	WFW
			Jun 1, 37	....	....	11.8, 15.4	71 20.8 N	....	....	...	EI 48	PGL
			Jun 3, 37	....	....	10.2-15.6(8)	71 18.9 N	....	....	...	EI 48	SEF
			Jun 4, 37	....	....	10.0-13.6(5)	71 18.3 N	....	....	...	EI 48	SEF
			Jun 4, 37	....	....	14.1-16.1(5)	71 17.9 N	....	....	...	EI 48	SEF
			Nov 1, 38	....	....	10.6-16.6(8)	71 21.9 N	....	....	...	EI 48	WES
			Nov 3, 38	....	....	10.8-16.5(8)	71 22.3 N	....	....	...	EI 48	WES
			Nov 4, 38	....	....	9.9-11.6(4)	71 22.3 N	....	....	...	EI 48	WES
			Nov 10-12, 38	....	....	....	....	10.1-16.3	.18202	27	....	WES
			M'y 26-29, 39	....	....	11.3-16.6(6)	71 23.6 N	....	....	...	EI 48	WFW
			Aug 3-4, 39	....	....	10.4-16.2(8)	71 21.1 N	....	....	...	EI 48	WFW
			Jan 17, 41	....	....	10.7-13.3(6)	71 26.2 N	....	....	...	EI 27	JWG
			Jan 17, 41	....	....	13.6-14.9(6)	71 24.8 N	....	....	...	EI 27	JWG
			Jan 21, 41	....	....	10.2-13.7(6)	71 23.1 N	....	....	...	EI 48	AKL
			Mar 12, 41	....	....	9.2-10.6(6)	71 23.8 N	....	....	...	EI 16	JWG
			Mar 12, 41	....	....	10.8-14.1(6)	71 22.4 N	....	....	...	EI 16	JWG
			Apr 4-7, 41	....	....	....	....	10.2-15.0	.18162	16	....	JWG
			Apr 8, 41	11.9-14.1 (6)	7 10.2 W	....	....	....	....	16	....	WES
			Apr 8, 41	14.3-15.5 (6)	7 09.3 W	....	....	....	....	16	....	WES
			Apr 14, 41	....	....	....	....	9.8-13.9	.18152	16	....	JWG
			Apr 17, 41	....	....	11.2-13.3(6)	71 22.8 N	....	....	...	EI 25	SLS
			Apr 17, 41	....	....	13.5-14.6(6)	71 22.6 N	....	....	...	EI 25	SLS
			Apr 18, 41	10.0-11.2 (6)	7 06.4 W	....	....	....	....	25	....	SLS
			Apr 28, 41	9.7-11.4 (6)	7 05.7 W	....	....	....	....	25	....	JWG
			Apr 28, 41	11.6-14.2 (7)	7 10.8 W	....	....	....	....	25	....	JWG
			Apr 28, 41	15.2-15.9 (4)	7 14.6 W	....	....	....	....	16	....	WES
			Apr 29, 41	9.8-11.7 (7)	7 04.8 W	....	....	....	....	16	....	WES
			Apr 29, 41	12.7-14.6 (6)	7 07.9 W	....	....	....	....	16	....	WES
			Apr 29, 41	15.0-15.8 (4)	7 07.4 W	....	....	....	....	25	....	JWG
			Nov 10-13, 41	....	....	....	....	11.3-14.8	.18148	16	....	WES
			Nov 14, 41	....	....	10.2-12.0(6)	71 23.2 N	....	....	...	EI 16	WES
			Nov 14, 41	....	....	12.8-14.6(6)	71 23.2 N	....	....	...	EI 16	WES
Cheltenham, Pier 3	38 44.0 N	283 10	Sep 21-22, 33	....	....	....	....	10.5-16.1	.18402	3	....	JWG
			Sep 26-27, 33	....	....	....	....	9.3-15.8	.18398	3	....	JWG
			Oct 10, 33	....	....	....	....	9.5-15.3	.18384	3	....	JWG
			Oct 11, 33	....	....	....	....	9.2-15.2	.18398	3	....	JWG
			Jul 15, 35	....	....	....	....	11.5-15.9	.18346	S-G1	....	SEF
			Jul 16, 35	....	....	....	....	10.4-15.6	.18332	S-G1	....	SEF
			Jul 17-18, 35	....	....	....	....	10.4-15.8	.18323	S-G1	....	F-J
			Jul 18-19, 35	....	....	....	....	12.4-16.0	.18342	3	....	JWG
			Oct 10, 35	....	....	....	....	16.6-17.0	.18309	S-G1	....	G-J
			Oct 11, 35	....	....	....	....	8.9-9.5	.18289	S-G1	....	G-J
Cheltenham, Pier 4	38 44.0 N	283 10	Jan 14, 35	....	....	....	....	14.3-15.1	.18355	S-G1	....	F-J
			Jan 14, 35	....	....	....	....	15.3-16.0	.18362	S-G1	....	F-J

NORTH AMERICA

United States--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Cheltenham, Pier 4 --concluded	38 44.0 N	283 10	Aug 13, '35	....	....	....	....	16.2, 16.4	.18347	S-G1	....	F-J
			Aug 19, 35	....	....	....	....	7.8-14.1	.18324	S-G1	....	F-J
			Aug 21-22, 35	....	....	....	....	9.4, 14.9	.18320	S-G1	....	F-J
			Aug 30, 35	....	....	....	....	8.4, 8.7	.18299	S-G1	....	F-J
			Sep 9, 35	....	....	....	....	10.4-13.6	.18331	S-G1	....	F-J
			Sep 13-15, 35	....	....	....	....	8.9-13.8	.18293	S-G1	....	F-J
			Sep 22-25, 35	....	....	....	....	9.4-15.8	.18313	S-G1	....	F-J
			Sep 30, 35	....	....	....	....	8.6-12.9	.18311	S-G1	....	F-J
			Oct 1, 35	....	....	....	....	11.6-12.0	.18312	S-G1	....	T-J
			Oct 1, 35	....	....	....	....	15.8-16.3	.18334	S-G1	....	T-J
			Oct 2, 35	....	....	....	....	11.2-12.9	.18303	S-G1	....	T-J
			Oct 2, 35	....	....	....	....	13.7-16.1	.18325	S-G1	....	T-J
			Oct 10, 35	....	....	....	....	10.8-13.6	.18287	S-G1	....	G-J
			Oct 11, 35	....	....	....	....	13.1-14.0	.18310	S-G1	....	G-J
			Nov 21, 35	....	....	....	....	8.9-13.1^{x}	.18289	S-G1	....	EAJ
			Nov 21, 35	....	....	....	....	13.4-16.2^{x}	.18310	S-G1	....	EAJ
			Feb 25, 36	....	....	....	....	16.3, 16.5	.18292	S-G1	....	EAJ
			Feb 26, 36	....	....	....	....	10.4-15.6^{x}	.18271	S-G1	....	EAJ
			Feb 26, 36	....	....	....	....	15.7-17.1^{x}	.18287	S-G1	....	EAJ
			Jul 2, 36	....	....	....	....	11.6-14.5^{x}	.18257	S-G1	....	EAJ
			Jul 2, 36	....	....	....	....	15.4-16.7^{x}	.18289	S-G1	....	EAJ
			Jul 3, 36	....	....	....	....	9.5-11.5^{x}	.18271	S-G1	....	EAJ
			Jul 10, 36	....	....	....	....	11.5-12.6^{x}	.18256	S-G1	....	EAJ
			Sep 30, 36	....	....	....	....	11.5-15.7^{x}	.18281	S-G1	....	EAJ
			Oct 1, 36	....	....	....	....	10.4-14.0	.18271	S-G1	....	EAJ
			Dec 8, 36	....	....	....	....	11.7-15.5^{x}	.18262	S-G1	....	SEF
			Dec 8-9, 36	....	....	....	....	10.1-15.8	.18269	S-G1	....	SEF
			Dec 9, 36	....	....	....	....	11.2-17.1^{x}	.18265	S-G1	....	SEF
			Jan 18-19, 37	....	....	....	....	11.5-15.9^{x}	.18262	S-G1	....	SEF
			Jan 19-21, 37	....	....	....	....	11.6-14.9^{x}	.18249	S-G1	....	SEF
			Jan 21, 37	....	....	....	....	13.4-14.6	.18242	S-G1	....	SEF
			Jan 26, 37	....	....	....	....	14.2-15.7	.18283	S-G1	....	SEF
			Feb 12, 37	....	....	....	....	10.7-14.9	.18231	S-G1	....	SEF
			Feb 19, 37	....	....	....	....	11.5-16.7	.18235	S-G1	....	SEF
			Feb 26, 37	....	....	....	....	10.6-12.0	.18236	S-G1	....	SEF
			Jun 3-4, 37	....	....	....	....	12.7-16.6	.18280	S-G1	....	SEF
			M'y 23-25, 39	....	....	....	....	13.3-16.0^{x}	.18204	S-G1	....	WFW
			May 26, 39	....	....	....	....	10.2-11.7	.18155	S-G1	....	WFW
Cheltenham, Pier 5	38 44.0 N	283 10	Sep 28, 33	8.4- 9.8 (6)	7 04.9 W	....	....	....	....	3	....	JWG
			Sep 28, 33	10.1-11.3 (6)	7 07.2 W	....	....	....	....	3	....	JWG
			Oct 2, 36	....	....	12.1-14.6(4)	71 19.1 N	....	....	...	EI 48	WFW
			Jan 22, 37	....	....	15.5, 15.9	71 18.7 N	....	....	...	EI 48	SEF
			Jan 25, 37	14.0-15.9 (6)	7 09.8 W	10.3-11.9(4)	71 20.8 N	....	....	3	EI 48	SEF
			Nov 7, 38	10.6-15.6 (8)	7 10.5 W	....	....	....	....	3	....	WES

^{x}Groups of data, four to seven observations in each group.

NORTH AMERICA

United States--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Cheltenham, Pier 6	38 44.0 N	283 10	Sep 22-23,'33	10.5-14.1 (7)	7 10.3 W	....	....	9.2-16.1	.18402	3	....	JWG
			Sep 25, 33	10.8-13.8 (7)	7 06.4 W	....	....	9.2-15.1	.18399	3	....	JWG
			Oct 3-4, 33	9.4-16.0 (6)	7 09.4 W	....	....	10.0-15.4	.18400	3	....	JWG
			Oct 5, 33	....	....	9.8-13.0(7)	71 15.4 N	....	....	...	EI 48	JWG
			Oct 16-17, 33	9.2-16.5 (6)	7 09.0 W	....	....	10.1-16.0	.18390	3	....	JWG
			Oct 20, 33	....	....	11.8-14.3(6)	71 15.3 N	....	....	...	EI 48	JWG
			Nov 4, 38	....	....	14.0-16.0(4)	71 21.5 N	....	....	...	EI 48	WES
			Nov 5, 38	....	....	9.8-11.0(3)	71 23.4 N	....	....	...	EI 48	WES
			Nov 5, 38	....	....	13.1-15.8(6)	71 21.6 N	....	....	...	EI 48	WES
			Nov 8, 38	10.5-16.0 (9)	7 12.5 W	....	....	....	....	27	....	WES
			Nov 10, 38	10.0-11.4 (4)	7 04.3 W	....	....	....	....	27	....	WES
			Nov 12-14, 38	....	....	....	....	10.0-15.8	.18180	27	....	WES
			Nov 28, 38	....	....	....	....	11.0-13.4[x]	.18180	QHM 42	....	WFW
			Nov 28, 38	....	....	....	....	15.0-16.1[x]	.18211	QHM 43	....	WFW
			Nov 29, 38	....	....	....	....	10.0-11.2[x]	.18175	QHM 44	....	WFW
			Nov 29, 38	....	....	....	....	13.2-14.2[x]	.18192	QHM 42	....	WFW
			May 23, 39	....	....	....	....	....	....	3	....	WFW
			M'y 25-26, 39	....	....	....	....	....	....	3	....	WFW
			May 29, 39	....	....	....	....	15.5-16.2	.18200	QHM 43	....	AGM
			May 31, 39	....	....	....	....	10.8-11.5	.18168	QHM 42	....	AGM
			May 31, 39	....	....	....	....	13.2-14.0	.18212	QHM 44	....	AGM
			May 31, 39	....	....	15.3-16.3(3)	71 19.4 N	....	....	...	EI 48	WFW
			Aug 5-7, 39	....	....	10.2-12.5(6)	71 22.3 N	....	....	...	EI 48	WFW
			Aug 24, 39	....	....	....	....	10.1-14.5	.18159	27	....	JWG
			Aug 25, 39	....	....	....	....	10.7-14.9	.18169	27	....	JWG
			Jan 26, 40	11.4-13.4 (6)	7 07.4 W	....	....	....	....	28	....	WES
			Jan 26, 40	13.6-14.7 (6)	7 06.7 W	....	....	....	....	28	....	WES
			Jan 29, 40	....	....	....	....	10.9-15.1	.18189	28	....	WES
			Jan 30, 40	....	....	....	....	10.1-15.3	.18193	28	....	WES
			Feb 1, 40	....	....	....	....	11.0, 12.1	.18119	28	....	WES
			Feb 2, 40	....	....	9.6-10.8(6)	71 24.5 N	....	....	...	EI 28	WES
			Feb 2, 40	....	....	10.9-13.0(6)	71 24.6 N	....	....	...	EI 28	WES
			Jan 15, 41	10.6-14.8 (4)	7 09.4 W	....	....	12.6-16.1(6)	.18183	27	....	JWG
			Jan 16, 41	10.3-16.2 (8)	7 07.6 W	....	....	11.3-15.9	.18179	27	....	JWG
			Jan 21, 41	....	....	10.2-13.7(7)	71 23.3 N	....	....	...	EI 27	JWG
			Apr 7, 41	....	....	....	....	11.2-15.7	.18170	25	....	WES
			Apr 8, 41	11.9-14.1 (6)	7 11.2 W	....	....	....	....	25	....	SLS
			Apr 8, 41	14.3-15.5 (6)	7 10.4 W	....	....	....	....	25	....	SLS
			Apr 10-11, 41	....	....	....	....	10.7-15.0	.18172	25	....	S-S
			Apr 14, 41	....	....	....	....	10.8-14.1	.18155	25	....	S-S
Cheltenham, Pier 7	38 44.0 N	283 10	Sep 19, 33	....	....	10.0-14.9(8)	71 14.2 N	....	....	...	EI 48	JWG
			Sep 21, 33	....	....	9.7-11.7(4)	71 15.5 N	....	....	...	EI 48	JWG
			Apr 28, 41	9.7-11.6 (6)	7 06.4 W	....	....	....	....	16	....	WES
			Apr 28, 41	12.7-14.2 (6)	7 12.0 W	....	....	....	....	16	....	WES
			Apr 29, 41	15.0-15.8 (4)	7 08.7 W	....	....	....	....	16	....	WES

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[x] Groups of data, four to seven observations in each group.

NORTH AMERICA

United States--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Cheltenham, Pier 7 --concluded	38 44.0 N	283 10	Apr 28,'41	15.2-15.9 (4)	7 15.6 W	....	....	....	....	25	....	JWG
			Apr 29, 41	9.8-12.9 (9)	7 05.8 W	....	....	....	....	25	....	JWG
			Apr 29, 41	13.7-14.6 (4)	7 09.2 W	....	....	....	....	25	....	JWG
			Nov 15, 41	9.5-11.7 (6)	7 05.8 W	....	....	....	....	16	....	WES
Cheltenham, Pier 8	38 44.0 N	283 10	Oct 9, 33	....	....	....	....	9.5-15.5	.18394	3	....	JWG
			Oct 12, 33	....	....	....	....	9.2-15.2	.18401	3	....	JWG
			Jul 8-9, 35	....	....	....	....	11.5-15.9	.18350	S-G1	....	F-J
			Jul 10-11, 35	....	....	....	....	9.7-15.0	.18327	S-G1	....	F-J
			Jul 15, 35	....	....	....	....	11.5-15.9	.18347	3	....	JWG
			Jul 16, 35	....	....	....	....	10.4-15.6	.18335	3	....	JWG
			Jul 17-18, 35	....	....	....	....	10.4-15.8	.18321	3	....	JWG
			Jul 18-19, 35	....	....	....	....	12.4-16.0	.18343	S-G1	....	F-J
			Jul 26, 35	....	....	....	....	13.0-14.7[x]	.18355	S-G1	....	F-J
			Oct 1, 35	....	....	....	....	11.4-15.7	.18323	18	....	JWG
			Oct 2, 35	....	....	....	....	10.8-15.9	.18311	18	....	JWG
			Oct 10, 35	....	....	....	....	14.6-15.8[x]	.18320	S-G1	....	G-J
			Nov 21, 35	....	....	....	....	9.8-17.0	.18311	28	....	WFW
			Feb 28, 36	....	....	....	....	13.6-15.5[x]	.18290	S-G1	....	EAJ
			Feb 28, 36	....	....	....	....	15.6-16.4	.18303	S-G1	....	EAJ
			Jul 3, 36	....	....	....	....	12.9-13.6[x]	.18288	S-G1	....	EAJ
			Jul 10, 36	....	....	....	....	16.5-17.1	.18356	S-G1	....	EAJ
			Jul 11, 36	....	....	....	....	9.0- 9.6	.18243	S-G1	....	EAJ
			Jul 11, 36	....	....	....	....	10.5-11.4[x]	.18278	S-G1	....	EAJ
			Jul 11, 36	....	....	....	....	13.1-13.9[x]	.18292	S-G1	....	EAJ
			Sep 9, 36	....	....	....	....	10.6-16.0	.18285	13	....	WFW
			Sep 10, 36	....	....	....	....	9.3-11.5	.18243	13	....	WFW
			Sep 30, 36	....	....	....	....	11.0-16.5	.18280	13	....	WFW
			Oct 1, 36	....	....	....	....	10.0-13.6	.18267	13	....	WFW
			Jan 18-19, 37	....	....	....	....	11.0-15.6	.18268	13	....	WFW
			Jan 21, 37	....	....	....	....	10.7-14.4	.18232	13	....	WFW
			Jan 26, 37	....	....	....	....	14.5, 15.5	.18279	13	....	WFW
Cheltenham, grounds	38 44.0 N	283 10	Sep 3, 30	8.6, 17.4	6 55.3 W	....	....	8.1-17.0	.18538	26	....	PGL
			Sep 3, 30	8.1-17.0 (dv)	7 01.5 W	....	....	....	....	26	....	PGL
			Sep 4, 30	....	....	8.0 to 17.0 (dv)	71 10.5 N	....	....	...	EI 26	PGL
La Plata	38 31.8 N	283 00	Sep 2, 30	13.8	6 49.2 W	11.4, 11.6	70 49.6 N	14.5	.18383	26	EI 26	PGL
Leonardtown	38 18.0 N	283 22	Apr 16, 28	15.9, 17.6	6 47.8 W	...... 17.6	70 25.5 N	16.3, 17.2	.19229	12	EI 24	AHK
			Apr 17, 28	....	....	8.7, 8.8	70 24.8 N	....	....	...	EI 12	JWG
Great Mills	38 14.0 N	283 30	Apr 18, 28	9.1	6 44.3 W	9.7	70 32.1 N	9.4	.19051	12	EI 24	G-K
St. Inigoes	38 09.0 N	283 36	Apr 18, 28	11.0	6 59.7 W	11.5	70 23.5 N	11.3	.19104	12	EI 24	G-K
Piney Point	38 08.2 N	283 28	Apr 26, 28	16.4	6 53.7 W	17.4	70 21.7 N	16.7	.19167	12	EI 24	G-K
St. George's Island, B	38 07.2 N	283 31	Apr 17, 28	12.8	6 54.1 W	15.8	70 24.1 N	13.4, 14.5	.19142	24	EI 24	AHK
St. George's Island, A	38 07.0 N	283 31	Apr 17, 28	12.2, 13.6	6 52.4 W	15.9, 16.0	70 23.2 N	12.6, 13.3	.19116	12	EI 12	JWG
Kitt's Point, A	38 06.4 N	283 35	Apr 19, 28	15.7	6 55.3 W	16.8	70 21.7 N	16.0	.19135	12	EI 12	JWG
			Apr 27, 28	11.0-13.9 (8)	6 53.1 W	9.8-15.8(8)	70 23.5 N	11.8-13.9	.19121	24	EI 24	AHK
			Apr 30, 28	....	....	16.2-17.2(4)	70 21.8 N	....	....	...	EI 24	AHK

[x] Groups of data, four to seven observations in each group.

NORTH AMERICA

United States--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Kitt's Point, A --concluded	38 06.4 N	283 35	May 1, '28	9.7-11.9 (6)	6 49.6 W	12.3-13.3(4)	70 20.7 N	10.5-11.9	.19130	24	EI 24	AHK
			May 2, 28	5.2-18.2 (dv)	6 49.8 W	....	....	7.4-17.2	.19119	24	....	AHK
			May 3, 28	9.9-16.8 (dv)	6 52.6 W	....	....	9.1-6.8	.19122	24	....	AHK
			May 4, 28	9.7-2.0 (4)	6 52.3 W	....	....	9.4-12.0	.19111	24	....	AHK
			May 5, 28	....	....	....	....	7.7-11.7	.19093	24	....	HWF
			May 5, 28	....	....	....	....	14.0, 15.0	.19152	24	....	HWF
Kitt's Point, B	38 06.4 N	283 35	May 2, 28	....	....	7.4 to 16.1 (dv)	70 23.2 N	....	....	...	EI 12	HWF
			May 3, 28	....	....	9.6-17.1(7)	70 23.2 N	....	....	...	EI 12	HWF
			May 4, 28	....	....	8.8-17.0(9)	70 23.9 N	....	....	...	EI 12	AHK
			May 5, 28	....	....	6.3-10.3(7)	70 24.8 N	....	....	...	EI 12	F-K
St. George's Island, C	38 06.3 N	283 32	Apr 27, 28	10.7-13.4 (8)	6 50.8 W	10.1-15.3(6)	70 23.4 N	11.2-13.4	.19125	12	EI 12	JWG
McGuire's Wharf	38 06.0 N	283 18	Apr 20, 28	12.5	7 15.5 W	12.9	70 36.0 N	12.8	.18962	12	EI 24	G-K
White Point	38 05.0 N	283 27	Apr 26, 28	....	....	11.0	70 18.3 N	11.3	.19218	12	EI 12	JWG
Briscoe Creek	38 04.8 N	283 38	Apr 18, 28	16.0, 17.3	6 38.0 W	17.7	70 25.5 N	16.3, 17.0	.19081	12	EI 12	JWG
Deep Creek	38 04.8 N	283 41	Apr 18, 28	16.9	6 34.3 W	15.9	70 27.2 N	17.3	.19072	24	EI 24	AHK
Sandy Point, B	38 04.7 N	283 27	Apr 25, 28	15.3	6 37.2 W	16.6	70 22.9 N	15.7	.19161	24	EI 24	AHK
Sandy Point, A	38 04.0 N	283 28	Apr 25, 28	15.4	6 37.3 W	16.4	70 24.2 N	15.7	.19148	12	EI 12	JWG
Hollywood Shores	38 03.5 N	283 39	May 1, 28	10.3-13.6 (5)	6 36.8 W	12.1-17.3(3)	70 28.5 N	10.8-11.3	.19062	12	EI 12	HWF
Point Lookout, A, 1919	38 03.0 N	283 41	Apr 19, 28	11.0	7 04.6 W	9.8	70 22.7 N	11.4	.19220	24	EI 24	AHK
Point Lookout, B	38 03.0 N	283 41	Apr 19, 28	11.1	7 03.6 W	12.0	70 23.1 N	11.4	.19213	12	EI 12	JWG
Kinsale	38 01.9 N	283 25	Apr 24, 28	15.8, 16.6	6 49.2 W	17.0	70 22.3 N	16.1	.19135	12	EI 12	JWG
Mundy Point	38 01.3 N	283 26	Apr 26, 28	8.6	6 32.2 W	9.5	70 15.0 N	8.9	.19226	12	EI 12	JWG
Thicket Point	38 01.2 N	283 29	Apr 25, 28	10.1	6 32.5 W	11.5	70 16.9 N	10.4	.19213	12	EI 12	JWG
Lewisetta	38 00.2 N	283 31	Apr 25, 28	10.6, 12.0	6 50.8 W	10.0	70 20.3 N	11.1	.19152	24	EI 24	AHK
Callao	37 58.1 N	283 26	Apr 21, 28	9.0	6 09.0 W	9.0	70 19.7 N	9.3	.19214	12	EI 24	G-K
Warsaw	37 57.5 N	283 17	Apr 20, 28	15.6	7 00.4 W	16.6	70 10.0 N	15.9	.19357	12	EI 24	G-K
Bay Quarter Neck	37 57.5 N	283 33	Apr 24, 28	9.7	6 36.9 W	10.7, 12.0	70 19.0 N	10.0, 12.6	.19172	12, 24	EI 12, EI 24	G-K
Hull Neck	37 57.3 N	283 38	Apr 22, 28	12.4	6 45.3 W	13.0, 13.2	70 18.4 N	12.7	.19140	12	EI 12, EI 24	G-K
Heathsville	37 55.2 N	283 31	Apr 24, 28	11.5	6 55.7 W	12.4	70 17.6 N	11.8	.19192	12	EI 12	JWG
Ophelia	37 54.2 N	283 44	Apr 22, 28	16.0	6 54.0 W	17.0	70 16.4 N	16.4	.19217	12	EI 12	JWG
Fort Scott, A	37 48.3 N	237 32	Aug 8, 29	....	....	....	....	11.0-15.3	.24470	24	....	CVII
			Aug 23, 29	....	....	....	....	15.1, 16.6	.24488	25	....	CVII
			Aug 29, 29	13.6, 14.0	17 54.6 E	....	....	10.5-12.4	.24468	25	....	CVII
			Aug 30, 29	....	....	14.2-17.0(6)	62 23.8 N	....	....	...	EI 25	CVII
			Aug 31, 29	11.5-12.2 (4)	17 54.6 E	10.7	62 22.3 N	....	....	25	EI 25	CVII
Fort Scott, B	37 48.3 N	237 32	Aug 15, 29	....	....	....	....	8.5-14.1	.24411	12	....	CVII
			Aug 22, 29	....	....	....	....	14.2, 15.9	.24413	25	....	CVII
			Aug 23, 29	....	....	....	....	9.3-13.7	.24440	25	....	CVII
			Aug 31, 29	12.9-14.0 (6)	18 04.3 E	8.6-10.1(6)	62 25.8 N	....	....	25	EI 25	CVII

SOUTH AMERICA

Argentina

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intesnity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
La Quiaca Observatory, Mag'r Pier	22 06.6 S	294 25	Mar 8, '32	9.9-16.7 (5)	4 26.1 E	....	....	10.4-17.1	.26221	26	....	JWG
			Mar 9, 32	8.6	4 23.6 E	....	....	9.0	.26245	26	....	JWG
La Quiaca Observatory, N. W. Pier	22 06.6 S	294 25	Mar 9, 32	....	....	10.6-13.8(6)	12 20.8 S	....	....	...	EI 26	JWG
La Quiaca Observatory, S. W. Pier	22 06.6 S	294 25	Mar 9, 32	....	....	14.5-16.0(6)	12 25.2 S	....	....	...	EI 26	JWG
La Quiaca Observatory, D	22 06.6 S	294 25	Mar 7, 32	10.2-17.1 (6)	4 26.4 E	....	....	10.6-16.7	.26220	26	....	JWG
Pilar Observatory, B	31 40.1 S	296 07	Feb 29, 32	7.1-11.7 (4)	6 11.5 E	14.9-16.6(6)	25 52.9 S	7.5-11.2	.24624	26	EI 26	JWG
			Mar 1, 32	7.3, 9.4	6 12.0 E	....	....	7.7, 8.7	.24617	26	....	JWG
			Mar 12, 32	8.5-13.0 (4)	6 13.4 E	....	....	9.0-12.6	.24622	26	....	JWG
			Mar 14, 32	7.6, 9.3	6 09.8 E	12.5-13.5(4)	25 51.4 S	8.0, 8.9	.24614	26	EI 26	JWG
			Mar 15, 32	....	....	7.5, 7.9	25 55.2 S	....	....	...	EI 26	JWG
			Jul 13, 33	....	....	8.6-10.0(6)	25 59.4 S[r]	....	....	...	EI 26	PGL
Pilar Observatory, D2	31 40.1 S	296 07	Mar 2, 32	....	....	15.9-17.4(6)	25 52.5 S	....	....	...	EI 26	JWG
			Mar 15, 32	....	....	11.1-12.3(6)	25 49.0 S	....	....	...	EI 26	JWG
			Jul 13, 33	....	....	11.2-12.3(6)	25 55.4 S[r]	....	....	...	EI 26	PGL
Pilar Observatory, D5	31 40.1 S	296 07	Mar 1, 32	10.9, 12.6	6 13.4 E	....	....	11.3, 12.1	.24658	26	....	JWG
			Mar 2, 32	7.5-12.3 (4)	6 10.6 E	....	....	8.0-11.7	.24686	26	....	JWG
			Mar 3, 32	11.1, 13.9	6 14.4 E	....	....	12.1, 13.3	.24636	26	....	JWG
			Mar 4, 32	7.4-12.2 (4)	6 14.1 E	....	....	7.8-11.8	.24630	26	....	JWG
Mendoza, A	32 53.5 S	291 09	Mar 21, 32	9.8-14.2 (4)	10 19.4 E	11.7-14.7(4)	28 51.7 S	10.2-13.8	.25085	26	EI 26	JWG
Mendoza, C	32 54.1 S	291 09	Mar 22, 32	12.6, 13.9	10 22.8 E	11.2, 11.4	28 51.7 S	12.9, 13.6	.25078	26	EI 26	JWG
Mercedes, B	34 39.6 S	300 31	Feb 12, 32	9.9, 11.2	3 41.7 E	11.8, 12.0	28 45.4 S	10.2, 10.9	.23906	26	EI 26	JWG
			Feb 12, 32	12.9, 14.4	3 46.0 E	14.7, 14.8	28 47.8 S	13.3, 14.1	.23904	26	EI 26	JWG
Bahia Blanca, A	38 43.7 S	297 48	Feb 17, 32	8.0, 9.5	7 15.0 E	11.0, 11.2	33 35.7 S	8.4, 9.2	.24296	26	EI 26	JWG
			Feb 17, 32	12.8, 14.2	7 15.8 E	14.6, 14.8	33 32.1 S	13.1, 13.8	.24325	26	EI 26	JWG
Bahia Blanca, B	38 46.4 S	297 43	Feb 18, 32	10.1, 11.7	7 17.0 E	12.8, 12.9	33 35.1 S	10.5, 11.3	.24277	26	EI 26	JWG
Puerto Madryn, A	42 45.2 S	294 57	Jun 30, 33	11.0, 13.6	10 55.6 E	10.5, 14.2	38 30 S[r]	11.4, 13.1	.24622	26	EI 26	PGL
			Jul 2, 33	13.5, 15.1	10 55.2 E	12.9, 13.0	38 30 S[r]	13.8, 14.7	.24618	26	EI 26	PGL
Puerto Madryn, B	42 45.3 S	294 58	Jul 1, 33	10.8, 13.5	10 48.4 E	10.6, 10.8	38 40 S[r]	11.3, 13.1	.24622	26	EI 26	PGL
			Jul 2, 33	9.8, 11.3	10 57.0 E	9.2, 9.3	38 41 S[r]	10.2, 10.9	.24614	26	EI 26	PGL
Dolavon	43 18.3 S	294 17	Jun 27, 33	10.8, 13.6	11 23.4 E	10.1, 10.4	38 50 S[r]	11.3, 13.2	.24877	26	EI 26	PGL
Colonia Las Heras	46 32.0 S	291 03	Jun 5, 33	10.6, 13.3	14 30.4 E	9.4, 9.5	42 33.4 S	11.0, 12.9	.25432	26	EI 26	PGL
Puerto Deseado, A	47 45.0 S	294 08	Jun 2, 33	10.7, 12.9	13 05.2 E	9.6, 9.8	43 33.0 S	11.2, 12.4	.25170	26	EI 26	PGL
			Jun 2, 33	13.2, 13.8	13 10.4 E	....	....	....	....	26	....	PGL
			Jun 8, 33	....	....	8.7 to 15.9 (dv)	43 32.5 S	....	....	26	....	PGL
			Jun 10, 33	7.7-15.9(dv)	13 08.7 E	....	....	7.7-15.9	.25184	26	....	PGL
Puerto Deseado, B	47 45.0 S	294 08	Jun 3, 33	11.7, 14.0	13 07.4 E	11.0, 11.2	43 31.8 S	12.2, 13.6	.25188	26	EI 26	PGL
Santa Cruz, A	50 00.9 S	291 28	May 16, 33	10.0, 12.4	15 22.2 E	9.2, 9.4	45 38.8 S	10.6, 11.4	.25704	26	EI 26	PGL
			May 21, 33	11.7, 13.5	15 24.6 E	11.0, 11.2	45 39.0 S	12.2, 13.1	.25703	26	EI 26	PGL
Santa Cruz, B	50 01.6 S	291 29	May 22, 33	10.7, 13.2	15 21.2 E	9.6, 9.7	45 40.8 S	11.1, 12.8	.25688	26	EI 26	PGL

[r] Approximate value; reduction to standard not known.

SOUTH AMERICA

Bolivia

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Cachuela Esperanza	10 32.6 S	294 25	Jun 3, '32	13.8	1 20.5 E	15.9, 16.0	8 27.4 N	14.2	.28755	16	EI 16	EH
			Jun 4, 32	9.9, 11.6	1 19.3 E	....	....	10.3, 11.2	.28790	16	....	EH
Guayaramerim, A	10 48.8 S	294 39	Jun 13, 32	9.7, 11.7	1 02.2 E	13.9, 14.0	8 43.4 N	10.1, 11.3	.28312	16	EI 16	EH
			Jun 14, 32	8.5 to 17.4(dv)	1 02.4 E	....	....	8.5-17.4	.28310	16	....	EH
Guayaramerim, B	10 48.8 S	294 39	Jun 15, 32	10.0, 11.7	1 19.0 E	14.2, 14.4	8 43.9 N	10.5, 11.3	.28539	16	EI 16	EH
Guayaramerim, Secondary	10 48.8 S	294 39	Jun 16, 32	....	....	....	....	10.8	.28693	16	....	EH
Riberalta	11 00.0 S	293 55	Jun 6, 32	9.3, 11.7	2 03.0 E	15.6, 15.8	7 56.2 N	9.8, 11.2	.29195	16	EI 16	EH
La Paz, A	16 30.5 S	291 50	Apr 28, 32	13.1, 14.3	4 40.7 E	15.6, 15.8	3 11.0 S	13.4, 14.0	.27760	26	EI 26	JWG
			Apr 29, 32	8.4, 9.8	4 38.7 E	10.3, 10.5	3 09.4 S	8.8, 9.5	.27754	26	EI 26	JWG
La Paz, B	16 31.2 S	291 49	Apr 28, 32	10.1, 11.4	4 41.2 E	11.6, 11.8	3 09.0 S	10.4, 11.1	.27786	26	EI 26	JWG
			Apr 29, 32	13.0, 14.3	4 42.0 E	14.7, 14.8	3 10.8 S	13.3, 14.0	.27736	26	EI 26	JWG

Brazil

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Clevelandia	3 49.0 N	308 09	Nov 16, '31	10.0, 11.4	10 32.4 W	13.6, 13.8	31 29.0 N	10.3, 11.1	.29182	26	EI 26	JWG
Boa Vista, A	2 49.0 N	299 21	Mar 26, 32	8.8, 11.0, 11.3	4 41.0 W	15.5, 15.6	30 58.7 N	9.2, 10.2	.29564	16	EI 16	EH
			Mar 28, 32	6.9 -17.6 (dv)	4 45.7 W	....	....	6.9-17.6	.29513	16	....	EH
			Mar 30, 32	....	....	7.3 - 17.6 (dv)	30 59.8 N	....	....	...	EI 16	EH
			Apr 3, 32	7.6-13.6 (dv)	4 40.6 W	....	....	7.6-13.6	.29545	16	....	EH
			Apr 3, 32	15.6-17.6 (dv)	4 42.4 W	....	....	15.6-17.6	.29494	16	....	EH
Boa Vista, B	2 49.0 N	299 20	Mar 31, 32	9.2, 16.7	4 47.3 W	11.0, 11.2	31 00.7 N	9.7, 16.1	.29522	16	EI 16	EH
Caracarahy	1 48.7 N	298 52	Mar 19, 32	13.9, 16.0	3 48.9 W	10.5, 10.7	29 38.2 N	14.4, 15.6	.30008	16	EI 16	EH
Cucuhy, A	1 11.4 N	293 10	Jan 22, 32	13.7, 15.9	0 09.0 W	....	....	14.2, 15.5	.30189	16	....	EH
			Jan 23, 32	10.9, 14.7	0 06.0 W	16.8, 17.1	28 45.6 N	11.3, 14.2	.30202	16	EI 16	EH
			Jan 24, 32	....	....	10.5, 10.7	28 43.0 N	....	....	...	EI 16	EH
Cucuhy, B	1 11.4 N	293 10	Jan 25, 32	10.0, 12.2	0 01.2 W	14.8, 15.0	28 53.8 N	10.7, 11.8	.30268	16	EI 16	EH
San Gabriel	0 08.2 S	292 54	Jan 28, 32	15.7	1 52.9 E	11.0, 11.2	26 42.8 N	16.1	.29308	16	EI 16	EH
Santa Isabel, B	0 25.2 S	294 58	Feb 2, 32	10.2, 12.1	0 16.8 W	....	....	10.7, 11.7	.30194	16	....	EH
			Feb 4, 32	....	....	16.0, 16.3	27 41.7 N	....	....	...	EI 16	EH
Santa Isabel, A	0 25.9 S	294 58	Feb 5, 32	10.2, 11.9	2 46.2 W	15.9, 16.1	27 27.6 N	10.6, 11.6	.29798	16	EI 16	EH
			Feb 6, 32	13.9	2 49.9 W	10.7, 10.9	27 27.7 N	14.3	.29774	16	EI 16	EH
Barcellos, A	0 58.5 S	297 05	Feb 10, 32	14.9, 16.9	2 15.8 W	....	....	15.4, 16.5	.29634	16	....	EH
			Feb 11, 32	11.2, 16.0	2 15.8 W	10.5, 16.7	25 38.0 N	11.6, 15.4	.29690	16	EI 16	EH
Barcellos, B	0 58.5 S	297 05	Feb 12, 32	10.8	2 14.0 W	....	....	11.2, 15.0	.29698	16	....	EH
Pinheiro	1 17.9 S	311 32	Dec 3, 31	7.6, 10.0	12 02.2 W	10.5, 10.7	21 49.0 N	7.9, 9.5	.29054	26	EI 26	JWG
			Dec 3, 31	12.3, 13.6	12 02.7 W	14.0, 14.2	21 50.4 N	12.6, 13.3	.29060	26	EI 26	JWG
			Dec 4, 31	10.4, 11.8, 13.0	12 00.1 W	9.7, 10.0	21 49.5 N	10.7, 11.5	.29049	26	EI 26	JWG
Obidos, A	1 55.0 S	304 29	Apr 22, 32	10.5, 15.4	7 16.8 W	9.9, 16.4	23 07.8 N	11.0, 14.9	.29212	16	EI 16	EH
			Apr 23, 32	8.8, 10.7	7 16.2 W	....	....	9.2, 10.3	.29183	16	....	EH
Obidos, B	1 55.0 S	304 29	Apr 24, 32	14.9, 15.2, 16.8	7 25.6 W	10.3, 10.4	23 11.4 N	15.6, 16.5	.29125	16	EI 16	EH
			Apr 25, 32	7.1-17.3 (dv)	7 23.3 W	....	....	7.1-17.3	.29128	16	....	EH
Santarem, A	2 24.9 S	305 18	Apr 29, 32	16.1	7 49.0 W	....	....	16.5, 17.0	.29014	16	....	EH
			Apr 30, 32	13.0, 14.8	7 48.6 W	9.5, 16.2	22 15.6 N	13.4, 14.4	.29033	16	EI 16	EH

SOUTH AMERICA

Brazil--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Santarem, B	2 25.0 S	305 16	May 1, '32	10.2, 15.0	7 49.5 W	17.0, 17.2	22 15.1 N	10.6, 14.6	.29064	16	EI 16	EH
Bocca do Jutahy	2 42 S	293 10	Jul 14, 32	....	....	17.6	21 58.5 N	16.6	.29767	16	EI 16	EH
Manoãs, D	3 07.0 S	299 56	May 12, 32	10.0, 11.7	3 38.3 W	13.5, 13.7	22 11.4 N	10.4, 11.4	.29303	16	EI 16	EH
			May 13, 32	10.2, 10.5, 13.9	3 40.8 W	....	....	10.9, 13.6	.29302	16	....	EH
			May 14, 32	7.2-17.0 (dv)	3 36.4 W	....	....	7.2-17.0	.29288	16	....	EH
			May 15, 32	....	....	7.7-12.3 (dv)	22 11.7 N	....	....	...	EI 16	EH
			Apr 18, 32	....	....	7.7-12.3 (dv)	22 10.6 N	....	....	...	EI 16	EH
			Apr 18, 32	....	....	14.0-14.3 (dv)	22 11.0 N	....	....	...	EI 16	EH
Manãos, B	3 07.6 S	299 58	Mar 4, 32	6.5, 8.7	3 51.6 W	15.0, 15.2	21 59.1 N	7.0, 8.3	.29358	16	EI 16	EH
			Mar 5, 32	7.3, 9.3	3 53.2 W	6.6, 6.8	21 59.7 N	7.7, 8.9	.29376	16	EI 16	EH
			May 20, 32	14.2, 15.7	3 59.2 W	10.2, 10.3	21 56.1 N	14.5, 15.4	.29384	16	EI 16	EH
Manãos, C	3 08.1 S	299 59	Apr 16, 32	9.8, 11.6	3 48.1 W	8.4, 8.6	21 56.6 N	10.2, 11.2	.29294	16	EI 16	EH
Manãos, A	3 08.7 S	299 59	Apr 15, 32	9.4, 11.3	4 03.6 W	13.0, 13.2	21 54.6 N	9.8, 10.9	.29290	16	EI 16	EH
Esperança	4 23.6 S	289 59	Jul 18, 32	7.9	2 50.2 E	....	....	8.6	.30180	16	....	EH
Natal	5 46.7 S	324 49	Dec 12, 31	9.9, 13.3	19 12.5 W	11.3, 14.5	3 46.8 N	9.9, 13.3	.27866	26	EI 26	JWG
Pernambuco, C	8 03.8 S	325 08	Dec 19, 31	13.0, 14.4	19 09.5 W	11.2, 11.4	0 48.6 S	13.3, 14.0	.27460[n]	26	EI 26	JWG
Pernambuco, B	8 04.9 S	325 07	Dec 18, 31	9.6, 11.3	19 09.4 W	12.2, 12.4	0 40.5 S	10.0, 11.0	.27394	26	EI 26	JWG
			Dec 18, 31	13.0, 14.5	19 11.8 W	15.8, 16.0	0 40.4 S	13.4, 14.1	.27410	26	EI 26	JWG
Pernambuco, A	8 06.8 S	325 06	Dec 21, 31	13.0, 14.8, 16.4	19 09.2 W	16.0, 16.2	0 34.8 S	13.6, 14.5	.27450	26	EI 26	JWG
			Dec 22, 31	6.0-17.7 (dv)	19 07.7 W	....	....	6.0-17.7	.27443	26	....	JWG
			Dec 23, 31	....	....	6.0-17.7 (dv)	0 35.4 S	....	....	...	EI 26	JWG
Porto Velho, A	8 46.0 S	296 06	Jun 20, 32	13.8, 14.1, 15.9	0 16.2 W	10.2, 10.3	12 16.6 N	14.5, 15.5	.28864	16	EI 16	EH
			Jun 21, 32	8.1-17.4 (dv)	0 16.2 W	....	....	8.1-17.4	.28900	16	....	EH
			Jun 22, 32	14.6, 16.2	0 16.4 W	....	....	15.0, 15.8	.28902	16	....	EH
			Jun 23, 32	....	....	8.3-17.1 (dv)	12 17.7 N	....	....	...	EI 16	EH
Porto Velho, B	8 46.0 S	296 06	Jun 24, 32	10.3, 12.1	0 20.4 W	14.9, 15.0	12 15.5 N	10.7, 11.7	.28970	16	EI 16	EH
Abunã	9 42.0 S	294 38	May 31, 32	....	....	15.9, 16.0	9 56.2 N	....	....	...	EI 16	EH
			Jun 1, 32	8.6, 13.0	1 05.0 E	10.3, 11.7	9 56.7 N	9.1, 12.5	.29024	16	EI 16	EH
Guajara Mirim	10 47.0 S	294 39	Jun 10, 32	14.0, 15.8	1 16.0 E	10.8, 11.0	8 03.0 N	14.4, 15.4	.28602	16	EI 16	EH
Bahia, A	13 00.2 S	321 29	Dec 27, 31	9.9, 12.7	17 10.9 W	13.2, 13.4	5 40.2 S	10.9, 12.3	.25777	26	EI 26	JWG
Bahia, B	13 00.2 S	321 29	Dec 28, 31	13.5, 15.2, 15.5	16 58.0 W	16.2, 16.4	5 45.4 S	13.9, 14.9	.25638	26	EI 26	JWG
			Dec 29, 31	6.0-17.8 (dv)	17 00.0 W	....	....	6.0-17.8	.25638	26	....	JWG
			Dec 30, 31	....	....	6.1-17.8 (dv)	5 44.3 S[r]	....	....	...	EI 26	JWG
Goyaz, B	15 56.4 S	309 53	Aug 24, 33	10.7, 13.8	9 13.8 W	10.0, 10.3	3 30.4 S[r]	11.3, 13.3	.26124	26	EI 26	PGL
Goyaz, A	15 56.6 S	309 55	Aug 23, 33	7.4, 10.8, 13.3	9 14.0 W	9.9, 10.1	3 30.8 S[r]	11.3, 12.9	.26202	26	EI 26	PGL
			Aug 26, 33	7.2-17.3 (dv)	9 14.0 W	....	....	7.2-17.3	.26189	26	....	PGL
Annapolis	16 19.2 S	311 08	Aug 29, 33	10.0, 11.6	10 06.4 W	8.7, 8.9	4 48.6 S[r]	10.4, 11.3	.25988	26	EI 26	PGL
Catalão, C	18 09.9 S	312 04	Sep 2, 33	8.7, 11.1	11 02.4 W	8.1, 8.3	8 09.9 S[r]	9.1, 10.6	.25302	26	EI 26	PGL
Catalão, A	18 10.8 S	312 07	Sep 1, 33	10.0, 12.2, 14.0	11 04.0 W	8.2, 16.9	8 13.7 S[r]	11.0, 13.2	.25256	26	EI 26	PGL
Catalão, B	18 10.8 S	312 07	Aug 31, 33	14.9, 16.8	11 03.4 W	13.8, 14.2	8 12.6 S[r]	15.4, 16.4	.25240	26	EI 26	PGL

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[n] From deflections. [r] Approximate value; reduction to standard not known.

SOUTH AMERICA

Brazil--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		H H H	° ′	h h	° ′	h h	c.g.s.			
Araguari	18 38.3 S	311 50	Sep 4, '33	9.8, 13.2	10 18.4 W	8.6, 8.8	8 50.8 S[r]	10.3, 12.8	.25306	26	EI 26	PGL
Vassouras Observatory, Pier A	22 24.0 S	316 21	Jan 8, 32	11.8-15.7(4)	12 53.0 W	....	....	12.2-15.3	.24020	26	....	JWG
			Jan 9, 32	7.8, 9.2	12 55.0 W	....	....	8.1, 8.9	.23985	26	....	JWG
Vassouras Observatory, Pier B	22 24.0 S	316 21	Jan 7, 32	11.8-17.1(6)	12 51.4 W	....	....	12.3-16.8	.24030	26	....	JWG
			Jan 9, 32	....	....	12.0-14.0(6)	17 15.4 S	....	....	...	....	JWG
Vassouras Observatory, Pier C	22 24.0 S	316 21	Jan 9, 32	....	....	14.6-16.4(6)	17 16.1 S	....	....	...	....	JWG

[r] Approximate value; reduction to standard not known.

Chile

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Arica	18 30.4 S	289 42	Apr 23, '32	13.2, 14.6, 16.7	5 44.4 E	15.9, 16.1	7 49.7 S	13.6, 14.3	.27730	26	EI 26	JWG
			Apr 24, 32	9.8, 11.3	5 42.4 E	11.8, 12.0	7 40.8 S	10.1, 11.0	.27776	26	EI 26	JWG
Antofagasta	23 42.2 S	289 42	Apr 19, 32	10.6-14.4(4)	7 52.5 E	12.9, 15.5	16 24.2 S	10.9-14.2	.26473	26	EI 26	JWG
Valparaiso, A	33 04.4 S	288 23	Apr 9, 32	10.6-15.3(4)	12 12.2 E	12.8-15.8(4)	30 01.0 S	10.9-15.0	.25328	26	EI 26	JWG
Valparaiso, B	33 04.4 S	288 23	Apr 8, 32	16.1, 17.2	12 11.5 E	17.6, 17.8	29 51.8 S	16.4, 17.0	.25308	26	EI 26	JWG
Santiago, B	33 26.7 S	289 18	Mar 31, 32	8.8, 15.8	12 01.4 E	....	....	....	....	26	....	JWG
			Apr 1, 32	8.9	11 58.2 E	15.6	30 00.2 S	....	....	26	EI 26	JWG
			Apr 4, 32	....	....	15.3	30 02.2 S	11.6, 12.4	.25399	26	EI 26	JWG
			Apr 5, 32	15.2, 15.6, 16.0	12 02.7 E	11.2	30 03.6 S	....	....	26	EI 26	JWG
Santiago, Magn'r Pier	33 26.7 S	289 18	Mar 31, 32	15.5	12 08.9 E	....	....	....	....	26	....	JWG
			Apr 5, 32	17.1, 17.4, 17.6	12 05.8 E	....	....	....	....	26	....	JWG
Santiago, A	33 27.0 S	289 18	Mar 29, 32	8.5-13.9(4)	12 02.4 E	11.6-14.4(4)	29 56.8 S	8.8-13.6	.25414	26	EI 26	JWG
			Feb 1, 33	10.4, 14.2	12 01.0 E	8.9, 14.9	29 55.5 S	11.1, 13.5	.25412	26	EI 26	PGL
Puerto Montt, B	41 28.7 S	287 03	Feb 27, 33	9.9, 12.9	15 14.8 E	8.2, 8.5	39 58.8 S	10.4, 11.4	.25436	26	EI 26	PGL
Puerto Montt, C	41 28.7 S	287 03	Feb 24, 33	9.9, 12.1	15 23.0 E	9.2, 13.0	39 52.8 S	10.7, 11.7	.25448	26	EI 26	PGL
			Feb 27, 33	16.2	15 28.0 E	....	....	....	....	26	....	PGL
			Feb 28, 33	....	....	7.8-17.3(dv)	39 51.2 S	....	....	...	EI 26	PGL
			Mar 1, 33	6.8-18.1 (dv)	15 24.6 E	....	....	6.8-18.1	.25473	26	....	PGL
			Mar 2, 33	10.2, 11.1	15 20.7 E	....	....	....	....	26	....	PGL
Puerto Montt, A	41 29.8 S	287 03	Feb 23, 33	10.7, 14.4	15 05.0 E	9.2, 15.0	39 51.6 S	11.3, 13.9	.25585	26	EI 26	PGL
			Feb 25, 33	10.6, 12.8	15 04.4 E	8.7, 12.5	39 51.0 S	11.1, 12.2	.25590	26	EI 26	PGL
Magallanes, C	53 08.9 S	289 06	Mar 15, 33	10.6-15.5(4)	17 51.0 E	8.6, 8.8	49 01.3 S	11.0, 13.4	.26014	26	EI 26	PGL
			Mar 21, 33	....	....	7.3, 7.6	49 00.6 S	....	....	...	EI 26	PGL
			Mar 22, 33	....	....	7.0-17.4(dv)	49 00.7 S	....	....	...	EI 26	PGL
			Mar 23, 33	6.8-17.6 (dv)	17 51.5 E	....	....	6.8-17.6	.25990	26	....	PGL
			Apr 28, 33	8.4, 12.0	17 47.3 E	....	....	9.5, 11.3	.26013	26	....	PGL
			Apr 30, 33	8.1, 11.4, 12.6	17 46.6 E	....	....	9.1-13.2	.26026	26	....	PGL
			May 1, 33	9.6	17 52.6 E	....	....	8.8	.26018	26	....	PGL
			May 11, 33	....	....	8.1-12.3(6)	49 00.0 S	....	....	...	EI 26	PGL

SOUTH AMERICA

Chile--concluded

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Magallanes, CH	53 08.9 S	289 06	May 1, '33	10.9, 14.8	17 54.9 E	....	....	11.8, 13.9	.25906	26	....	PGL
			May 2, 33	8.6, 11.7	17 47.8 E	....	....	9.4, 11.0	.25967	26	....	PGL
			May 2, 33	12.6, 15.0	17 49.0 E	....	....	13.2, 14.4	.25986	26	....	PGL
			May 11, 33	....	....	13.8, 14.5	49 02.8 S	....	....	...	EI 26	PGL
Magallanes, E	53 08.9 S	289 06	Mar 27, 33	10.3, 12.1	14 27.7 E	9.6, 9.8	46 13.9 S	10.8, 11.7	.26982	26	EI 26	PGL
Magallanes, A	53 11.0 S	289 03	Mar 16, 33	10.1, 13.3	17 50.2 E	8.5, 8.7	49 05.9 S	10.6, 11.6	.26015	26	EI 26	PGL
Magallanes, B	53 11.0 S	289 03	Mar 17, 33	13.5, 14.3	17 54.6 E	12.9, 13.1	49 03.5 S	14.0, 14.9	.26035	26	EI 26	PGL
Magallanes, D	53 11.0 S	289 03	Mar 20, 33	8.9, 10.5	17 48.9 E	8.2, 8.4	49 05.8 S	9.3, 10.2	.26014	26	EI 26	PGL
Colombia												
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Puerto Colombia	10 59.6 N	285 02	Jan 9, '33	....	....	15.6, 15.7	42 01.0 N	....	....	...	EI 16	EH
			Jan 10, 33	9.8	2 20.1 E	....	....	10.2	.30331	16	....	EH
Barranquilla	10 59.3 N	285 13	Jan 8, 33	10.1, 11.4	2 16.2 E	12.9, 13.0	42 07.6 N	10.4, 11.1	.30233	16	EI 16	EH
Puerto Berrio	6 28.9 N	285 36	Dec 29, 32	14.1, 15.8	2 58.1 E	10.8, 10.9	35 28.6 N	14.5, 15.4	.30918	16	EI 16	EH
			Dec 30, 32	10.6, 12.1	3 03.6 E	14.4	35 32.1 N	10.9, 11.7	.30958	16	EI 16	EH
Puerto Berrio, Sec. 1	6 28.9 N	285 36	Dec 30, 32	....	....	15.0	35 34.0 N	....	....	...	EI 16	EH
Puerto Berrio, Sec. 2	6 28.9 N	285 36	Dec 30, 32	....	....	15.3	35 33.0 N	....	....	...	EI 16	EH
Bogota, B	4 37.6 N	285 54	Dec 23, 32	10.2	3 10.3 E	....	....	....	....	16	....	EH
			Dec 24, 32	9.3, 11.2	3 09.0 E	11.9, 12.0	32 25.6 N	9.8, 10.8	.30960	16	EI 16	EH
			Dec 24, 32	13.1, 14.8	3 04.6 E	15.2, 15.3	32 27.4 N	13.4, 14.4	.30943	16	EI 16	EH
			Dec 26, 32	10.8, 13.0	3 10.0 E	13.5, 13.6	32 29.8 N	11.2, 12.6	.30944	16	EI 16	EH
Buenaventura	3 54.1 N	282 55	Dec 14, 32	10.4, 12.1	4 41.5 E	9.7, 9.8	30 09.1 N	10.8, 11.7	.31440	16	EI 16	EH
Cali	3 27.1 N	283 26	Dec 17, 32	9.3, 11.0	4 41.8 E	12.8, 13.7	30 00.9 N	9.7, 10.7	.31362	16	EI 16	EH
Cali, Secondary	3 27.1 N	283 26	Dec 17, 32	....	....	13.3	29 56.6 N	....	....	...	EI 16	EH
Ecuador												
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Quito, A	0 13.1 S	281 31	Nov 22, '32	10.4, 14.9	6 23.0 E	12.1, 12.3	23 13.8 N	11.0, 14.5	.31664	16	EI 16	EH
			Nov 23, 32	11.0, 13.7	6 24.6 E	10.1, 10.3	23 11.8 N	11.5, 13.4	.31667	16	EI 16	EH
Quito, B	0 13.1 S	281 28	Nov 24, 32	14.0	6 09.0 E	13.2, 13.3	22 07.4 N	14.1	.32084[e]	16	EI 16	EH
			Nov 25, 32	10.7, 11.6	6 10.2 E	....	....	10.4, 11.3	.32116	16	....	EH
Quito, C	0 13.6 S	281 29	Nov 25, 32	....	....	16.3, 16.4	23 24.9 N	....	....	...	EI 16	EH
			Nov 26, 32	10.6, 13.6	6 06.4 E	....	....	10.1-13.2	.31564	16	....	EH
			Nov 27, 32	9.7, 11.4	6 04.8 E	12.8, 13.0	23 25.2 N	....	....	16	EI 16	EH
			Nov 28, 32	....	....	10.4-13.8(3)	23 23.9 N	....	....	...	EI 16	EH
Quito, C, Sec. 1	0 13.6 S	281 29	Nov 28, 32	....	....	11.1	23 18.8 N	....	....	...	EI 16	EH
Quito, C, Sec. 2	0 13.6 S	281 29	Nov 28, 32	....	....	12.3	22 57.9 N	....	....	...	EI 16	EH
Quito, C, Sec. 3	0 13.6 S	281 29	Nov 28, 32	....	....	14.4	23 03.6 N	....	....	...	EI 16	EH
Guayaquil	2 10.8 S	280 09	Nov 17, 32	11.3, 15.0	7 00.0 E	10.7, 10.8	18 50.8 N	11.7, 14.7	.31575	16	EI 16	EH
			Dec 6, 32	14.0, 14.3, 15.7	6 57.3 E	....	....	14.6, 15.4	.31603	16	....	EH
			Dec 7, 32	8.9-16.0(dv)	6 59.0 E	....	....	8.9-16.0	.31603	16	....	EH

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[e] From oscillations only.

SOUTH AMERICA

Guiana

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Georgetown, A	6 48.8 N	301 51	Oct 30, '31	10.3, 12.1	6 56.8 W	12.7, 12.9	37 07.6 N	10.9, 11.8	.29233	26	EI 26	JWG
			Oct 30, 31	13.3, 15.1	6 59.0 W	14.3, 15.4	37 06.6 N	13.6, 14.8	.29204	26	EI 26	JWG
Georgetown, B	6 48.8 N	301 51	Oct 29, 31	16.0, 17.1	6 57.3 W	17.4, 17.6	37 07.6 N	16.3, 16.8	.29187	26	EI 26	JWG
Bartica	6 25.0 N	301 22	Nov 1, 31	12.3, 14.5	6 29.0 W	14.8, 15.0	36 57.7 N	12.7, 13.9	.29156	26	EI 26	JWG
Paramaribo	5 50.0 N	304 52	Nov 5, 31	11.5, 13.0	8 34.7 W	14.0, 14.2	35 35.5 N	11.9, 12.7	.29117	26	EI 26	JWG
			Nov 5, 31	15.3, 16.4	8 36.8 W	....	....	15.6, 16.1	.29065	26	....	JWG
			Nov 6, 31	8.5, 11.1	8 35.4 W	12.0, 12.2	35 33.9 N	8.8, 10.8	.29099	26	EI 26	JWG
Cayenne, A	4 56.1 N	307 41	Nov 12, 31	9.9, 11.3	10 46.5 W	13.1, 13.4	33 54.6 N	10.2, 11.0	.29220	26	EI 26	JWG
			Nov 12, 31	15.1, 16.3	10 49.8 W	16.7	33 56.1 N	15.4, 16.0	.29163	26	EI 26	JWG
Cayenne, C	4 56.1 N	307 41	Nov 13, 31	8.8, 10.4	10 39.8 W	10.8, 11.0	35 207. N	9.2, 10.1	.28902	26	EI 26	JWG

Peru

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Iquitos, A	3 45.6 S	286 45	Jul 26, '32	14.2, 16.6	4 28.4 E	10.8, 11.0	18 25.8 N	14.6, 16.2	.30640	16	EI 16	EH
			Jul 27, 32	8.7	4 31.5 E	....	....	....	....	16	....	EH
			Jul 27, 32	9.0-14.1 (dv)	4 28.1 E	....	....	9.0-14.1	.30643	16	....	EH
			Jul 29, 32	11.6	4 27.9 E	....	....	....	....	16	....	EH
			Jul 29, 32	11.9-17.5 (dv)	4 29.2 E	....	....	11.9-17.5	.30634	16	....	EH
			Jul 30, 32	8.4-17.1 (dv)	4 28.7 E	....	....	8.4-17.1	.30640	16	....	EH
			Jul 31, 32	....	....	8.9 - 15.8 (dv)	18 26.3 N	....	....	...	EI 16	EH
Iquitos, B	3 45.6 S	286 45	Jul 28, 32	14.2, 15.9	4 27.8 E	13.2, 13.4	18 26.0 N	14.6, 15.5	.30680	16	EI 16	EH
Nauta	4 29.3 S	286 26	Aug 6, 32	15.4, 17.1	4 47.2 E	14.1, 14.3	16 50.8 N	15.8, 16.8	.30587	16	EI 16	EH
			Aug 7, 32	8.3	4 50.6 E	....	....	8.7	.30625	16	....	EH
Barranca, A	4 49.6 S	283 20	Aug 15, 32	8.3, 10.3	6 16.0 E	10.9, 11.0	15 18.1 N	9.0, 10.0	.30888	16	EI 16	EH
			Aug 15, 32	13.1	6 14.1 E	....	....	13.5	.30872	16	....	EH
Barranca, B	4 49.7 S	283 20	Aug 16, 32	10.1, 11.6	6 17.0 E	8.6, 8.8	15 05.4 N	10.5, 11.2	.30909	16	EI 16	EH
Paita	5 04.7 S	278 54	Nov 10, 32	10.0, 11.4	8 06.0 E	13.1, 13.2	12 31.8 N	10.3, 11.1	.31393	16	EI 16	EH
Tres Unidos, A	5 05.6 S	284 23	Aug 18, 32	9.7, 11.3	5 55.0 E	11.9, 12.0	15 11.9 N	10.1, 11.0	.30804	16	EI 16	EH
			Aug 18, 32	13.3, 14.9	5 54.1 E	....	....	13.6, 14.5	.30791	16	....	EH
Tres Unidos, B	5 05.7 S	284 24	Aug 17, 32	12.7, 14.2	5 52.4 E	15.4, 15.5	15 14.6 N	13.1, 13.8	.30758	16	EI 16	EH
Piura, B	5 11.4 S	279 22	Nov 6, 32	14.1	8 02.9 E	11.6, 11.7	12 31.8 N	14.2	.31430[e]	16	EI 16	EH
			Nov 7, 32	9.4, 11.1, 13.8	8 04.9 E	....	....	9.8, 10.8	.31484	16	....	EH
			Nov 7, 32	....	....	....	....	14.1	.31442	16	....	EH
Piura, A	5 11.7 S	279 22	Nov 8, 32	9.3, 10.9	8 00.7 E	14.4, 14.5	12 37.4 N	9.7, 10.6	.31405	16	EI 16	EH
Yurimaguas, A	5 53.9 S	283 55	Aug 24, 32	9.9, 11.4	6 14.5 E	14.5, 14.6	13 08.0 N	10.2, 11.0	.30840	16	EI 16	EH
			Aug 24, 32	15.0, 16.5	6 15.1 E	17.3, 17.4	13 08.6 N	15.3, 16.2	.20805	16	EI 16	EH
Yurimaguas, B	5 54.0 S	283 54	Aug 26, 32	9.4, 11.3	6 14.7 E	13.4, 13.5	13 08.4 N	9.8, 10.9	.30780	16	EI 16	EH
Moyobamba, A	6 04.4 S	283 02	Sep 1, 32	9.6, 11.2, 11.4	6 29.7 E	13.5, 13.6	12 38.4 N	10.0, 10.8	.30788	16	EI 16	EH
			Sep 3, 32	8.9-12.5 (dv)	6 33.4 E	....	....	8.9-12.5	.30756	16	....	EH
			Sep 4, 32	8.0-16.9 (dv)	6 34.6 E	....	....	8.0-16.9	.30739	16	....	EH
			Sep 5, 32	....	....	8.6- 17.2 (dv)	12 34.0 N	....	....	...	EI 16	EH

[e] From oscillations only.

SOUTH AMERICA

Peru--continued

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Moyobamba, B	6 04.5 S	283 02	Sep 1, '32	15.4	6 43.1 E	....	....	15.8	.30727	16	....	EH
			Sep 2, 32	9.6	6 44.4 E	11.0, 11.1	12 34.1 N	10.0	.30782	16	EI 16	EH
Moyobamba, C	6 04.5 S	283 02	Sep 2, 32	16.0	6 42.8 E	14.4, 14.6	12 36.0 N	16.4	.30715	16	EI 16	EH
Chachapoyas	6 12.6 S	282 07	Sep 18, 32	13.9	7 07.4 E	10.8, 10.9	11 46.5 N	14.2	.30840	16	EI 16	EH
			Sep 19, 32	9.8, 11.3	7 08.5 E	....	....	10.1, 10.9	.30886	16	....	EH
Cajamarca, A	7 07.8 S	281 29	Sep 28, 32	14.0	7 37.6 E	11.4, 11.6	9 50.4 N	14.4	.30618	16	EI 16	EH
			Sep 29, 32	9.8, 11.3	7 34.4 E	....	....	10.2, 11.0	.30682	16	....	EH
			Sep 30, 32	10.6	7 34.9 E	9.8, 9.9	9 50.0 N	10.9	.30697	16	EI 16	EH
Cajamarca, B	7 07.8 S	281 29	Oct 1, 32	10.9, 12.6	7 33.8 E	13.2, 13.4	9 58.8 N	11.2, 12.1	.30659	16	EI 16	EH
Chilete	7 13.2 S	281 10	Oct 4, 32	9.9, 11.6	7 47.3 E	14.1, 14.3	9 18.0 N	10.4, 11.2	.30963	16	EI 16	EH
Pacasmayo, A	7 23.4 S	280 26	Oct 7, 32	....	....	10.4, 10.6	8 32.0 N	....	....	...	EI 16	EH
			Oct 8, 32	9.2, 11.2	7 55.2 E	....	....	9.9, 10.8	.30971	16	....	EH
Pacasmayo, B	7 23.4 S	280 26	Oct 9, 32	10.4, 12.0	7 59.4 E	14.4	8 30.2 N	10.8, 11.6	.30987	16	EI 16	EH
Huancayo Observatory (Annual means from magnetograph values)	12 02.7 S	284 40	1927	....	7 50.4 E	....	1 17.3 N	....	.29659	10	EI 5	OWT
			1928	....	7 46.1 E	....	1 25.8 N	....	.29646	10	EI 5	PGL
			1929	....	7 41.6 E	....	1 33.9 N	....	.29636	10	EI 5	PGL
			1930	....	7 36.5 E	....	1 42.5 N	....	.29614	10	EI 5	PGL
			1931	....	7 30.8 E	....	1 50.3 N	....	.29624	10	EI 5	PGL
			1932	....	7 25.7 E	....	1 58.5 N	....	.29617	10	EI 5	PGL
			1933	....	7 21.4 E	....	2 04.7 N	....	.29614	10	EI 5	JEIC
			1934	....	7 18.1 E	....	2 08.4 N	....	.29622	10	EI 5	JEIC
			1935	....	7 15.2 E	....	2 11.1 N	....	.29612	10	EI 5	OWT
			1936	....	7 11.6 E	....	2 13.5 N	....	.29609	10	EI 5	OWT
			1937	....	7 08.3 E	....	2 15.3 N	....	.29594	10	EI 5	FTD
			1938	....	7 04.6 E	....	2 15.6 N	....	.29572	10	EI 5	FTD
			1939	....	7 00.4 E	....	2 15.1 N	....	.29554	10	EI 5	FTD
			1940	....	6 55.9 E	....	2 14.3 N	....	.29517	10	EI 5	HWW
			1941	....	6 50.3 E	....	2 13.6 N	....	.29471	10	EI 5	PGL
			1942	....	6 45.3 E	....	2 12.5 N	....	.29438	10	EI 5	PGL
			1943	....	6 40.0 E	....	2 11.5 N	....	.29400	10	EI 5	PGL
			1944	....	6 34.8 E	....	2 10.3 N	....	.29367	10	EI 5	PGL
Huancayo Observatory, Em	12 02.7 S	284 40	Jan 24, 29	13.8, 16.4	7 42.7 E	....	....	14.7, 15.9	.29686	10	....	VJE
			Jan 25, 29	8.8-16.3 (4)	7 43.4 E	....	....	9.3-15.6	.29677	10	....	E-F
			Jan 28, 29	....	....	11.7-16.2 (6)	1 26.7 N	....	....	...	EI 5	PGL
			Jan 29, 29	10.0, 11.5	7 45.4 E	....	....	10.6	.29734	10	....	PGL
			Jul 26, 29	....	....	10.2-16.5(6)	1 33.3 N	....	....	...	EI 5	REG
			Nov 7, 29	10.0-13.8 (6)	7 42.2 E	....	....	....	....	10	....	VJE
			Nov 9, 29	....	....	....	....	13.7, 14.8	.29664	10	....	VJE
			Nov 10, 29	....	....	....	....	10.5-14.8	.29724	10	....	VJE
			May 24, 32	13.4 to 16.9 (4)	7 26.4 E	....	....	13.8-16.5	.29641	10	....	PGL
			May 25, 32	8.7, 10.4	7 27.6 E	14.4-16.2(6)	1 54.1 N	9.2, 10.0	.29648	10	EI 5	PGL
			May 26, 32	....	....	9.4, 9.7	1 54.7 N	....	....	...	EI 5	PGL
			Oct 17, 32	....	....	14.1-16.1(6)	1 58.2 N	....	....	...	EI 5	JEIC
			Oct 18, 32	8.9 to 16.0 (6)	7 25.2 E	....	....	9.4-14.8	.29668	10	....	PGL
			Oct 19, 32	....	....	....	....	9.6, 10.7	.29666	10	....	PGL

SOUTH AMERICA

Peru--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Huancayo Observatory, Em--concluded	12 02.7 S	284 40	Nov 19, 36	8.4 to 11.0 (4)	7 10.1 E	....	....	9.1, 10.3	.29736	10	....	WES
			Nov 19, 36	13.2 -15.2 (4)	7 12.4 E	....	....	13.8, 14.6	.29666	10	....	FTD
			Nov 20, 36	8.6-11.1 (4)	7 10.3 E	....	....	9.4, 10.4	.29674	10	....	WES
			Nov 26, 36	....	....	10.2-14.1(6)	2 14.7 N	....	....	...	EI 5	WES
Huancayo Observatory, Wm	12 02.7 S	284 40	Jan 26, 29	9.6-17.4 (6)	7 47.6 E	....	....	10.0-16.8	.29686	10	....	L-F
			Jan 27, 29	....	....	11.6-17.2(6)	1 31.1 N	....	....	...	EI 5	SEF
			Jan 28, 29	....	....	9.5-10.8(3)	1 28.9 N	....	....	...	EI 5	PGL
			Jan 29, 29	12.2, 14.2	7 48.7 E	....	....	12.5	.29737	10	....	PGL
			Jul 18, 29	....	....	14.6, 15.2	1 34.3 N	....	....	...	EI 5	REG
			Jul 19, 29	....	....	9.2-11.4(4)	1 36.4 N	....	....	...	EI 5	REG
			Nov 7, 29	14.6-17.1 (6)	7 41.3 E	....	....	....	....	10	....	VJE
			Nov 8, 29	....	....	....	....	11.2-16.5	.29672	10	....	VJE
			Nov 9, 29	....	....	....	....	9.6, 10.8	.29684	10	....	VJE
			May 23, 32	8.5-15.6 (7)	7 27.2 E	....	....	8.9-14.8	.29622	10	....	JEIC
			May 24, 32	....	....	8.8-11.2(6)	1 56.8 N	....	....	...	EI 5	JEIC
			Oct 17, 32	....	....	9.6-11.8(6)	1 58.7 N	....	....	...	E 15	JEIC
			Oct 19, 32	13.5, 15.2	7 28.6 E	....	....	13.9, 14.8	.29631	10	....	PGL
			Oct 20, 32	9.2-16.2 (4)	7 27.1 E	....	....	9.7-15.8	.29608	10	....	JEIC
			Nov 20, 36	13.4-15.3 (4)	7 12.0 E	....	....	14.0, 14.8	.29621	10	....	FTD
			Nov 21, 36	8.5-11.2 (4)	7 14.5 E	....	....	9.2, 10.6	.29660	10	....	WES
			Nov 21, 36	13.3-15.2 (4)	7 13.2 E	....	....	13.9, 14.7	.29650	10	....	FTD
			Nov 25, 36	....	....	13.8-15.2(4)	2 12.2 N	....	....	...	EI 5	D-T
			Nov 26, 36	....	....	9.0, 9.3	2 15.0 N	....	....	...	EI 5	WES
Las Palmas, A	12 10.5 S	283 00	Feb 1, 29	....	....	....	....	10.0-12.7	.29978	24	....	CVII
			Feb 2, 29	14.5-15.8 (4)	8 28.8 E	9.9-14.1(4)	0 15.6 N	....	....	24	EI 24	CVII
Las Palmas, B	12 10.5 S	283 00	Jan 24, 29	....	....	....	....	12.8-16.8	.29882	12	....	CVII
			Jan 25, 29	....	....	....	....	11.0, 11.6	.29916	12	....	CVII
			Feb 1, 29	....	....	....	....	10.0-12.7	.29982	12	....	CVII
			Feb 1, 29	....	....	....	....	13.8-16.7	.29928	24	....	CVII
Juliaca, A	15 30.0 S	289 52	May 4, 32	16.2, 17.4	5 31.1 E	12.0, 14.5	2 12.0 S	16.4, 17.1	.28150	26	EI 26	JWG
			May 5, 32	12.2, 14.2	5 34.0 E	15.4, 15.6	2 12.0 S	12.6, 13.8	.28218	26	EI 26	JWG
Juliaca, B	15 30.0 S	289 52	May 4, 32	13.4, 14.8	5 29.6 E	15.1, 15.3	2 11.6 S	13.7, 14.5	.28161	26	EI 26	JWG
			May 5, 32	8.8, 11.0	5 37.2 E	11.3, 11.4	2 09.0 S	10.1, 10.7	.28282	26	EI 26	JWG
Arequipa, B	16 22.5 S	288 27	May 9, 32	13.5-16.8 (4)	6 30.0 E	14.1, 16.5	4 28.5 S	15.3, 15.9	.28302	26	EI 26	JWG
Arequipa, C	16 24.7 S	288 27	May 10, 32	12.5, 14.0	6 38.4 E	10.5, 10.8	4 18.7 S	12.8, 13.7	.28337	26	EI 26	JWG
			May 11, 32	....	....	7.5-17.6 (dv)	4 18.9 S	....	....	...	EI 26	JWG
			May 12, 32	7.2-17.6 (dv)	6 36.9 E	....	....	7.2-17.6	.28282	26	....	JWG
Mollendo	17 01.8 S	287 59	Jan 4, 33	....	....	11.2, 11.6	5 40.0 S	....	....	...	EI 26	PGL
			Jan 5, 33	11.2, 13.9	6 51.6 E	10.3, 14.7	5 46.6 S	12.1, 13.4	.27968	26	EI 26	PGL

SOUTH AMERICA

Uruguay

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Colon, A	34 48.3 S	303 44	Feb 2, '32	10.1, 11.7	1 03.4 E	13.5, 13.7	28 52.4 S	10.5, 11.3	.23580	26	EI 26	JWG
Colon, B	34 48.3 S	303 44	Feb 2, 32	16.1, 17.8	1 02.1 E	....	....	16.5, 17.4	.23550	26	....	JWG
			Feb 3, 32	10.0, 11.6	1 06.9 E	9.5, 9.6	28 53.2 S	10.4, 11.2	.23550	26	EI 26	JWG
			Feb 3, 32	13.8, 15.3	1 05.6 E	15.7, 15.9	29 00.4 S	14.2, 15.0	.23539	26	EI 26	JWG

Venezuela

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° '	° '		h h h	°	h h	° '	h h	c.g.s.			
Maracaibo	10 40.7 N	288 24	Oct 26, '31	10.3	0 40.9 E	14.4, 14.5	42 15.6 N	10.8	.29938	16	EI 16	EH
			Oct 26, 31	13.8	0 38.5 E	....	....	13.2	.29954	16	....	EH
Isla Pajaro	10 35.5 N	288 28	Oct 23, 31	13.3	0 34.7 E	12.6, 12.7	42 15.6 N	13.9	.29967	16	EI 16	EH
			Oct 25, 31	12.9, 14.8	0 33.5 E	11.2, 11.4	42 14.6 N	13.4, 14.4	.29948	16	EI 16	EH
Caracas, A	10 30.4 N	293 04	Oct 4, 31	11.7	2 02.0 W	15.6, 15.8	42 35.1 N	12.4	.29492	16	EI 16	EH
			Oct 4, 31	14.7	2 05.0 W	....	....	14.1	.29424	16	....	EH
			Oct 8, 31	13.4, 13.9, 16.3	2 05.1 W	11.0, 11.3	42 28.7 N	14.5, 15.9	.29450	16	EI 16	EH
Caracas, B	10 30.4 N	293 04	Oct 9, 31	12.1, 14.6, 15.4	2 08.4 W	17.1	42 32.5 N	12.6, 14.1	.29489	16	EI 16	EH
			Oct 10, 31	7.3-17.6 (dv)	2 08.4 W	....	....	7.3-17.6	.29478	16	....	EH
			Oct 12, 31	....	....	7.4	42 31.3 N	....	....	...	EI 16	EH
			Oct 12, 31	....	....	8.0-17.0 (dv)	42 32.6 N	....	....	...	EI 16	EH
Puerto Cabello	10 28.4 N	292 00	Oct 17, 31	10.4	1 26.4 W	14.4, 14.6	42 27.5 N	10.8	.29616	16	EI 16	EH
			Oct 17, 31	13.6	1 28.4 W	....	....	13.1	.29607	16	....	EH
Villa de Cura	10 02.5 N	292 30	Nov 11, 31	12.3, 14.6	1 55.2 W	10.3, 10.5	42 11.6 N	12.9, 14.2	.29318	16	EI 16	EH
Valera	9 19.4 N	289 25	Oct 31, 31	12.7, 15.6	0 16.0 E	10.3, 10.5	40 22.8 N	13.2, 15.2	.30054	16	EI 16	EH
Ciudad Bolivar, A	8 09.5 N	296 28	Nov 28, 31	9.8, 11.6	3 44.3 W	13.9, 14.1	39 34.4 N	10.2, 11.1	.29728	16	EI 16	EH
			Nov 28, 31	14.4	3 47.9 W	....	....	14.8	.29708	16	....	EH
			Nov 29, 31	12.9	3 48.8 W	....	....	13.5	.29711	16	....	EH
			Nov 30, 31	12.5, 14.2	3 47.4 W	11.1, 11.2	39 31.5 N	12.9, 13.8	.29732	16	EI 16	EH
Cuidad Bolivar, B	8 09.5 N	296 28	Dec 5, 31	10.8	3 45.1 W	....	....	11.3	.29702	16	....	EH
San Ferando de Apure	7 53.9 N	292 32	Nov 22, 31	10.6	1 03.7 W	8.4, 8.6	39 07.0 N	11.0	.29728	16	EI 16	EH
			Nov 23, 31	8.9	1 04.4 W	10.8, 11.0	39 04.6 N	8.4	.29704	16	EI 16	EH
			Nov 23, 31	12.9, 14.9	1 05.4 W	....	....	13.4, 14.5	.29704	16	....	EH
La Urbana, A	7 08.5 N	293 03	Dec 13, 31	9.6, 11.4	1 21.6 W	7.9, 8.2	37 58.9 N	10.0, 11.0	.29694	16	EI 16	EH
			Dec 13, 31	14.1, 15.9	1 24.8 W	13.5, 13.6	37 59.4 N	14.5, 15.5	.29690	16	EI 16	EH
La Urbana, B	7 08.5 N	293 03	Dec 14, 31	12.9, 15.8	1 21.4 W	10.1, 10.3	38 01.9 N	13.4, 15.3	.29661	16	EI 16	EH
Puerto Ayacucho, A	5 40.8 N	292 22	Dec 20, 31	14.1, 17.3	0 26.7 W	11.5, 11.7	35 19.8 N	14.5, 16.9	.30270	16	EI 16	EH
			Dec 21, 31	17.2	0 25.5 W	....	....	7.6-17.5	.30235	16	....	EH
			Dec 21, 31	7.6 to 17.5 (dv)	0 23.7 W	....	....	....	....	16	....	EH
			Dec 23, 31	....	....	10.6, 10.8	35 19.2 N	....	....	...	EI 16	EH
Puerto Ayacucho, B	5 40.8 N	292 22	Dec 19, 31	14.1, 16.3	0 27.6 W	....	....	14.8, 15.9	.30178	16	....	EH
			Dec 23, 31	....	....	8.4, 8.6	35 26.2 N	....	....	...	EI 16	EH
Zamuro	5 39.2 N	292 23	Dec 22, 31	10.9, 14.3	0 28.1 W	10.2, 10.4	35 23.0 N	11.3, 13.8	.30266	16	EI 16	EH

SOUTH AMERICA

Venezuela--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
San Fernando de Atabapo, A	4 03.0 N	292 19	Jan 2, '32	13.9, 15.8	0 15.8 W	11.4, 11.6	33 24.8 N	14.4, 15.4	.30004	16	EI 16	EH
			Jan 3, 32	7.4	0 15.2 W	....	....	7.7-17.5	.30017	16	....	EH
			Jan 3, 32	7.7 to 17.5 (dv)	0 14.3 W	....	....	....	....	...	EI 16	EH
			Jan 4, 32	....	....	7.5 - 17.0 (dv)	33 26.8 N	....	....	...	EI 16	EH
San Fernando de Atabapo, B	4 03.0 N	292 19	Jan 1, 32	10.3, 15.3	0 19.0 W	....	....	10.8, 14.7	.30040	16	EI 16	EH
			Jan 2, 32	....	....	8.5, 8.7	33 24.2 N	....	....	...	EI 16	EH
Maroa	2 40.9 N	292 26	Jan 13, 32	14.4, 16.8	0 14.3 E	8.6, 8.8	31 04.1 N	14.9, 16.3	.30125	16	EI 16	EH
Comunidad	2 23.1 N	292 49	Jan 15, 32	13.3, 15.2	0 53.4 W	16.8, 17.0	30 53.6 N	13.7, 14.8	.30110	16	EI 16	EH
San Carlos	1 55.2 N	292 58	Jan 17, 32	13.6, 15.8	0 48.5 E	17.4, 17.5	28 20.0 N	14.0, 15.4	.30680	16	EI 16	EH

ISLANDS, ATLANTIC OCEAN

Iceland

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Reykjavik, Engey Island	64 10.4 N	338 05	Jul 24, '28	13.7, 16.5	41 27.8 W	....	....	14.1-16.1	.11698	24	....	CVII
			Jul 25, 28	10.6, 12.3	41 30.2 W	14.1, 14.3	77 04.4 N	11.1, 11.9	.11485	24	EI 24	CVII

West Indies

	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Havana, Casa Blanca, A	23 09.4 N	277 39	Aug 10, '31	15.2, 17.0	3 18.2 E	14.4, 14.6	55 45.4 N	15.7, 16.6	.27664	26	EI 26	JWG
Havana, Casa Blanca, B	23 09.4 N	277 39	Aug 11, 31	13.1, 14.6	3 11.4 E	11.1, 11.3	55 52.8 N	13.4, 14.2	.27605	26	EI 26	JWG
Matanzas	23 03.5 N	278 26	Aug 19, 31	10.3, 11.8	2 47.8 E	12.9, 13.1	55 52.2 N	10.8, 11.6	.27555	26	EI 26	JWG
Cayo Frances[r]	22 39 N	280 46	Mar 7, 27	....	....	14.5	55 26 N	....	....	...	125.45	SEL
			Mar 15, 27	....	....	14.8	55 22 N	....	....	...	125.45	SEL
			Mar 22, 27	.. ..	....	9.8	55 25 N	....	....	...	125.45	SEL
			Apr 3, 27	9 , 12	1 48 E	....	....	10.0, 11.0	.2781	143	....	SEL
			Apr 28, 27	9, 11	1 51 E	....	....	9.0, 10.0	.2782	143	....	SEL

[r] Approximate value; reduction to standard not known.

ISLANDS, ATLANTIC OCEAN

West Indies--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	°	h h	° ′	h h	c.g.s.			
Pinar del Rio	22 25.0 N	276 18	Aug 15, '31	13.3, 15.2	4 23.5 E	16.1, 16.2	54 32.6 N	13.9, 14.8	.28090	26	EI 26	JWG
			Aug 16, 31	8.2, 11.2	4 29.6 E	11.7, 12.5	54 29.6 N	10.0, 10.8	.28122	26	EI 26	JWG
Santiago, B	20 02.6 N	284 13	Aug 24, 31	10.3, 11.6, 14.4	0 33.5 E	13.2, 13.4	53 46.8 N	10.6-14.7	.27699	26	EI 26	JWG
Santiago, A	20 00.5 N	284 12	Aug 22, 31	10.1, 11.7	0 33.2 E	13.1, 13.2	53 43.8 N	10.5, 11.3	.27822	26	EI 26	JWG
			Aug 22, 31	13.6, 16.1	0 35.8 E	14.6, 16.5	53 44.0 N	13.9, 15.7	.27810	26	EI 26	JWG
			Aug 24, 31	10.2, 14.1	0 34.1 E	15.0, 15.2	53 44.4 N	10.8, 13.5	.27826	16	EI 16	EH
Santiago, C	20 00.5 N	284 11	Aug 22, 31	13.7, 16.5	0 36.9 E	11.0, 11.2	53 43.0 N	14.6, 15.9	.27758	16	EI 16	EH
Montego Bay, A	18 28.5 N	282 04	Sep 3, 31	10.1, 14.2	2 09.0 E	15.7, 15.9	51 00.0 N	10.9, 13.6	.28820	16	EI 16	EH
			Sep 5, 31	13.2	2 08.1 E	11.2, 11.4	50 59.0 N	13.7	.28771	16	EI 16	EH
Montego Bay, B	18 28.5 N	282 04	Sep 4, 31	14.8, 17.0	2 08.2 E	10.6, 10.8	50 58.5 N	15.3, 16.4	.28764	16	EI 16	EH
San Juan, EI Pier	18 23 N	293 53	Sep 17, 31	....	....	11.3-15.7 (dv)	52 36.1 N	....	....	...	EI 16	EH
			Sep 25, 31	....	....	9.4-12.3(7)	52 34.6 N	....	....	...	EI 26	G-H
San Juan, Mag'r Pier	18 23 N	293 53	Sep 19, 31	10.3-15.6 (6)	5 01.3 W	....	....	10.8-15.2	.27443	26	....	JWG
			Sep 20, 31	10.0-15.0 (6)	5 01.2 W	....	....	10.4-14.7	.27443	26	....	JWG
			Sep 24, 31	8.2-16.1 (6)	5 01.1 W	....	....	8.8-15.7	.27407	26	....	EH
San Juan, Tent Station	18 23 N	293 53	Sep 25, 31	14.3, 15.7	5 04.1 W	....	....	14.6, 15.3	.27426	26	....	JWG
			Sep 26, 31	11.3	4 59.5 W	....	....	11.8	.27420	26	....	EH
			Sep 27, 31	10.0, 12.4	4 59.5 W	....	....	10.7, 11.9	.27444	26	....	EH
			Sep 28, 31	10.5	4 59.2 W	13.2, 13.8	52 33.5 N	10.9, 11.6	.27428	26	EI 26	JWG
			Sep 29, 31	....	....	13.1-14.4(4)	52 32.6 N	....	....	...	EI 26	JWG
Kingston, B	18 05.3 N	283 12	Sep 4, 31	9.8, 11.4	1 32.4 E	13.4, 13.6	51 50.4 N	10.2, 11.0	.28298	26	EI 26	JWG
			Sep 7, 31	9.2, 13.8, 16.0	1 31.9 E	10.2, 10.4	51 50.0 N	14.1, 15.7	.28302	26	EI 26	JWG
Kingston, A	17 58.9 N	283 11	Sep 3, 31	9.3-15.3 (5)	0 57.0 E	11.8, 15.8	50 57.1 N	9.7-14.9	.28926	26	EI 26	JWG
Kingston, C	17 58.7 N	283 16	Sep 8, 31	12.5, 13.8	1 04.0 E	10.7, 10.9	50 58.7 N	12.8, 13.5	.28755	26	EI 26	JWG
Bathsheba	13 12.3 N	300 29	Oct 22, 31	10.4, 13.2	7 54.0 W	12.2, 12.4	46 05.0 N	10.8, 12.9	.28293	26	EI 26	JWG
Bridgetown, A	13 04.8 N	300 25	Sep 24, 28	10.8, 11.2	7 13.5 W	....	....	....	....	24	....	CVII
			Sep 25, 28	....	....	13.9, 14.2	45 50.4 N	8.0-13.0	.28393	24	EI 24	CVII
			Sep 26, 28	15.4, 15.7	7 18.3 W	....	....	9.4-11.5	.28399	24	....	CVII
			Oct 20, 31	11.6, 13.2, 16.5	7 48.3 W	16.0, 16.2	45 56.4 N	12.0-16.8	.28324	26	EI 26	JWG
			Oct 21, 31	10.0	7 48.9 W	11.2	45 52.8 N	10.4	.28349	26	EI 26	JWG
Bridgetown, B	13 04.8 N	300 25	Oct 21, 31	13.2, 16.1	7 48.6 W	12.3, 12.5	45 55.0 N	15.0, 15.8	.28294	26	EI 26	JWG
Bridgetown, D	13 04.8 N	300 25	Sep 26, 28	....	....	....	....	12.3-14.8	.28398	24	....	CVII
Port of Spain, A	10 40.0 N	298 29	Oct 10, 31	9.8, 11.3	5 43.7 W	14.0, 14.2	42 45.0 N	10.2, 11.0	.29132	26	EI 26	JWG
Port of Spain, B	10 40.0 N	298 29	Oct 13, 31	9.6, 11.4	5 41.0 W	13.8, 13.9	42 47.3 N	10.0, 11.0	.29067	26	EI 26	JWG
Port of Spain, C	10 40.0 N	298 29	Oct 13, 31	16.9	5 44.5 W	....	....	....	....	26	....	JWG
			Oct 14, 31	6.2-17.6 (dv)	5 43.9 W	....	....	6.2-17.6	.29085	26	....	JWG
			Oct 15, 31	....	....	6.2-17.6 (dv)	42 45.8 N	....	....	...	EI 26	JWG
San Fernando, A	10 16.8 N	298 32	Oct 16, 31	12.0, 13.6	5 41.4 W	11.5, 11.6	42 14.8 N	12.5, 13.3	.29030	26	EI 26	JWG

ISLANDS, INDIAN OCEAN

Zanzibar

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Zanzibar, A	6 10.2 S	39 11	Apr 21, '31	17.7	3 34.9 W	....	....	....	....	18	....	AW
			Apr 22, 31	6.8, 8.3	3 35.3 W	....	....	10.0	.28082	18	....	AW
			Oct 3, 34	10.0, 10.2	3 28.8 W	8.0, 8.2	35 54.2 S	10.7, 11.7	.28200	18	EI 18	RHM
			Oct 3, 34	12.2-15.5 (4)	3 26.4 W	12.8-15.8 (3)	35 54.2 S	14.2, 15.0	.28167	18	EI 18	RHM
Zanzibar, B (Chuckwani)	6 15.0 S	39 13	Apr 24, 31	7.2	3 37.6 W	....	....	7.9	.28173	18	....	AW
			Apr 25, 31	9.2, 11.2	3 40.8 W	7.9	35 55.1 S	9.8, 10.7	.28244	18	EI 18	AW
			Apr 25, 31	11.4-15.9 (dv)	3 37.3 W	....	....	11.4-15.9	.28175	18	....	AW
			Apr 26, 31	....	....	8.8, 16.0	35 57.7 S	....	....	...	EI 18	AW
			Apr 26, 31	....	....	9.7-15.2 (dv)	35 57.4 S	....	....	...	EI 18	AW
			Oct 2, 34	12.5-15.9 (4)	3 28.8 W	11.6, 16.5	36 03.2 S	14.0, 15.2	.28120	18	EI 18	RHM
			Oct 4, 34	11.1-14.0 (4)	3 29.3 W	8.3, 14.5	36 02.4 S	12.3, 13.3	.28152	18	EI 18	RHM

ISLANDS, PACIFIC OCEAN

Bismarck Archipelago

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Lombrum	2 02.4 S	147 23	Oct 18, '36	16.8, 17.2	4 44.8 E	....	....	....	....	28	....	WCP
Kavieng	2 34.1 S	150 48	Oct 24, 36	9.8, 10.9	5 28.2 E	9.5, 11.3	18 09.0 S	10.1, 10.6	.36867	28	EI 28	WCP
Rabaul	4 11.8 S	152 12	Oct 12, 36	9.3-14.4 (4)	4 24.0 E	8.8-12.8 (4)	21 18.9 S	9.6-14.1	.37007	28	EI 28	WCP
Pondo	4 33.7 S	151 38	Oct 25, 36	8.5, 9.4	5 43.2 E	8.2, 9.7	20 48.0 S	8.7, 9.2	.36962	28	EI 28	WCP

Easter Island

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s			
Cook Bay	27 08.0 S	250 34	Dec 8, '28	15.9	15 27.3 E	....	....	16.5, 17.3	.30256	24	....	CVII
			Dec 10, 28	5.4, 5.6, 18.0	15 24.8 E	....	....	7.3, 16.7	.30252	24	....	CVII
			Dec 10, 28	6.0-18.1 (dv)	15 26.6 E	6.7-18.3 (dv)	38 05.3 S	6.0-18.1	.30273	24	EI 12	CVII
			Nov 16, 33	10.4	16 08.1 E	....	....	....	....	21	....	TCP

Fiji Island

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Suva, Base Station	18 07.5 S	178 26	Aug 3, '37	10.6, 12.0	10 58.0 E	10.1, 12.4	39 40.5 S	10.9, 11.7	.33983	28	EI 28	WCP

Galapagos

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s			
Albemarle Island	0 49.0 S	268 32	Apr 17, '35	10.6	10 11.1 E	....	....	....	....	241	....	EHB
			Apr 17, 35	13.5	10 12.1 E	....	....	13.1	.32050	21	....	EHB

ISLANDS, PACIFIC OCEAN

Gilbert Islands

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Apiang Island	1 48.8 N	173 02	Apr 16, '37	9.8, 11.1	8 35.4 E	9.5, 11.3	3 06.1 S	10.0, 10.8	.35484	28	EI 28	WCP
Nonuti Atoll	0 47.8 S	174 28	Apr 7, 37	10.4-16.0 (4)	8 42.7 E	10.1, 11.8	7 32.6 S	10.8, 11.3	.35414	28	EI 28	WCP
Ocean Island	0 52.6 S	169 32	Apr 3, 37	9.6-16.2 (4)	8 27.6 E	9.1-16.4(4)	8 12.3 S	9.9-16.0	.35822	28	EI 28	WCP
Ocean Island, Secondary	0 54.2 S	169 33	Apr 5, 37	7.9, 8.5	8 18.9 E	....	....	....	....	28	....	WCP
Tapetenea Island	1 14.4 S	174 46	Apr 8, 37	17.2, 17.9	8 56.0 E	16.0, 16.6	8 07.7 S	14.9, 15.4	.34948	28	EI 28	WCP
Arorai Island	2 38.5 S	176 46	Apr 11, 37	17.5, 18.0	8 43.0 E	....	....	....	....	28	....	WCP
			Apr 12, 37	8.2, 9.7	8 41.4 E	6.5, 7.7	9 52.4 S	8.5, 9.4	.35896	28	EI 28	WCP

Hawaiian Islands

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Sisal, Honolulu Magnetic Obs'y, Pier A	21 19.2 N	201 56	Jul 10, '37	....	....	9.1-11.3(6)	39 06.2 N	....	....	...	EI 13	WCP
			Jul 10, 37	....	....	12.7-14.8(6)	39 05.5 N	....	....	...	EI 28	WCP
			Jul 12, 37	8.0-13.8 (6)	10 12.2 E	....	....	8.4-13.5	.28543	28	....	WCP
			Jul 12, 37	14.8, 16.3	10 11.0 E	....	....	15.3, 16.0	.28530	13	....	WCP
			Jul 13, 37	7.9-11.1 (4)	10 18.0 E	....	....	8.3-10.8	.28538	13	....	WCP
Sisal, Honolulu Magnetic Obs'y, Pier B	21 19.2 N	201 56	Jul 9, 37	....	....	13.5-15.2(6)	39 07.9 N	....	....	...	EI 13	WCP
			Jul 13, 37	13.0-15.7 (4)	10 08.9 E	....	....	13.3-15.4(3)	.28519	13	....	WCP
			Jul 14, 37	7.7, 8.9	10 17.8 E	....	....	8.0, 8.6	.28470	13	....	WCP
			Jul 14, 37	9.5-14.6 (5)	10 13.6 E	....	....	9.9-14.3	.28471	28	....	WCP
			Jul 16, 37	11.8	10 11.1 E	13.7-15.5(6)	39 07.1 N	12.3	.28526	28	EI 28	WCP
			Jul 16, 37	....	....	....	....	13.0	.28521	13	....	WCP

Malay Archipelago

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° '	° '		h h h	° '	h h	° '	h h	c.g.s.			
Batavia Obs'y, Pier 1	6 11.0 S	106 50	Jun 17, '38	....	....	....	....	22.0-24.4	.37082	28	....	WCP
			Jun 20, 38	....	....	....	....	22.2, 23.9	.37106	28	....	WCP
			Jun 22, 38	....	....	....	....	21.4, 22.3	.37093	28	....	WCP
			Jun 27, 38	....	....	....	....	22.0, 13.7	.37118	28	....	WCP
			Jun 28, 38	....	....	....	....	0.8, 2.2	.37109	28	....	WCP
Batavia Obs'y, Pier 3	6 11.0 S	106 50	Jun 16, 38	....	....	....	....	22.1-24.8	.37087	28	....	WCP
			Jun 22, 38	....	....	....	....	23.0, 24.0	.37097	28	....	WCP
			Jun 23, 38	....	....	....	....	0.5, 1.3	.37096	28	....	WCP
			Jun 26, 38	....	....	....	....	22.0-24.8	.37114	28	....	WCP
Batavia Obs'y, Pier 5	6 11.0 S	106 50	Jun 21, 38	....	....	21.4-23.4(6)	32 30.5 S	....	....	...	EI 28	WCP
Batavia Obs'y, Pier 6	6 11.0 S	106 50	Jun 18, 38	....	....	21.7-23.6(6)	32 30.1 S	....	....	...	EI 28	WCP
			Jun 19, 38	....	....	22.0-23.7(6)	32 29.2 S	....	....	...	EI 28	WCP

ISLANDS, PACIFIC OCEAN

Malay Archipelago--concluded

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Batavia Obs'y, Pier 7	6 11.0 S	106 50	Jun 11, '38	22.3-23.9 (6)	1 17.6 E	....	....	....	....	28	....	WCP
			Jun 14, 38	22.7, 22.9, 23.9	1 17.6 E	....	....	....	....	28	....	WCP
			Jun 15, 38	0.1, 0.7, 0.8	1 17.7 E	....	....	....	....	28	....	WCP
			Jun 23, 38	22.8-23.8 (4)	1 17.1 E	....	....	....	....	28	....	WCP
			Jun 24, 38	0.5-1.8 (4)	1 17.1 E	....	....	....	....	28	....	WCP
Batavia Obs'y, Pier 9	6 11.0 S	106 50	Jun 15, 38	21.9-23.6 (6)	1 17.1 E	....	....	....	....	28	....	WCP

Marianas

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Guam, Sumay A	13 26.2 N	144 39	May 22, '29	10.1, 11.7	1 42.6 E	8.7, 9.2	13 28.7 N	10.5, 11.3	.35067	24	EI 24	CVII

Nauru

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Nauru	0 32.1 S	166 55	Mar 29, '37	9.5, 10.8	8 50.0 E	9.1, 11.1	9 14.0 S	9.9, 10.5	.35198	28	EI 28	WCP
			Mar 29, 37	13.2, 14.5	8 53.2 E	12.7, 14.8	9 13.4 S	13.5, 14.2	.35162	28	EI 28	WCP

New Caledonia

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Bourail	21 34.4 S	165 31	Nov 3, '37	13.8, 14.9	10 16.8 E	12.8, 15.9	46 46.2 S	14.0, 14.6	.33250	28	EI 28	WCP
			Nov 4, 37	7.2, 8.3	10 07.2 E	6.5, 8.9	46 49.4 S	7.4, 8.0	.33214	28	EI 28	WCP
Noumea	22 16.6 S	166 27	Oct 30, 37	16.4, 16.9	10 52.5 E	....	....	....	....	28	....	WCP
			Nov 1, 37	9.2, 10.4	10 43.9 E	8.9, 10.6	47 40.0 S	9.5, 10.1	.32942	28	EI 28	WCP
			Nov 1, 37	13.9, 15.0	10 53.8 E	13.6, 15.6	47 38.6 S	14.2, 14.7	.32983	28	EI 28	WCP

New Guinea

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Wiewak	3 33.7 S	143 38	Oct 20, '36	15.0, 15.4	4 27.1 E	....	....	....	....	28	....	WCP
Boram	3 43.3 S	143 41	Oct 20, 36	....	....	8.1, 9.7	20 56.0 S	8.8, 9.2	.37421	28	EI 28	WCP
Madang	5 12.6 S	145 49	Oct 17, 36	15.2, 16.2	4 54.6 E	14.0, 14.8	23 56.2 S	15.4, 15.9	.36824	28	EI 28	WCP
			Oct 21, 36	17.1, 17.6	4 51.0 E	....	....	....	....	28	....	WCP
Salamaua	7 04.1 S	147 03	Oct 15, 36	15.6, 16.2	5 11.2 E	16.5	26 55.6 S	15.9	.36926	28	EI 28	WCP
Port Moresby, B	9 28.1 S	147 10	Oct 30, 36	10.1, 11.0	5 41.6 E	9.8, 11.3	31 02.9 S	10.4, 10.8	.36764	28	EI 28	WCP
			Oct 30, 36	13.7, 14.6	5 44.7 E	11.8, 15.5	31 02.1 S	13.9, 14.4	.36777	28	EI 28	WCP
Samarai, A	10 37.4 S	150 40	Oct 29, 36	10.0, 11.0	8 30.1 E	9.8, 11.6	33 24.8 S	10.3, 10.8	.38006	28	EI 28	WCP

ISLANDS, PACIFIC OCEAN

New Hebrides

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Port Patterson, Banks Islands	13 50.8 S	167 34	Sep 12, '37	14.8, 15.3	9 19.0 E	9.2	35 31.0 S	9.8	.35717	28	EI 28	WCP
Luganville, Santo Island	15 31.1 S	167 10	Sep 10, 37	14.0, 15.5	9 02.1 E	11.4, 12.4	37 46.8 S	14.5, 15.2	.35144	28	EI 28	WCP
Port Vila (Fila)	17 44.3 S	168 19	Sep 17, 37	9.4, 10.7	9 41.4 E	8.9, 11.2	40 56.4 S	9.8, 10.4	.34517	28	EI 28	WCP
			Sep 17, 37	14.5, 15.8	9 48.6 E	14.1, 16.1	40 54.5 S	14.8, 15.5	.34484	28	EI 28	WCP

Samoa Islands

Station	Latitude	Long. East of Gr.	Date	Decl. LMT	Decl. Value	Incl. LMT	Incl. Value	Hor. Int. LMT	Hor. Int. Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Apia Observatory, A	13 48.4 S	188 14	Apr 10, '29	....	....	....	....	7.7-11.8	.35195	12	....	CVII
			Apr 13, 29	11.4-12.8 (6)	10 36.0 E	....	....	....	....	12	....	CVII
			Apr 18, 29	....	....	7.9-10.1(6)	30 01.8 S	....	....	...	EI 12	CVII
Apia Obs'y, Pier N	13 48.4 S	188 14	Apr 11, 29	....	....	....	....	8.4-12.2	.35239	12	....	CVII
			Apr 12, 29	....	....	....	....	7.4, 8.8	.35228	12	....	CVII
			Apr 13, 29	8.5-10.8 (6)	10 32.5 E	....	....	....	....	12	....	CVII
			Apr 15, 29	....	....	....	....	8.0-12.4	.35219	12	....	CVII
			Apr 17, 29	....	....	....	....	7.4, 8.0	.35200	12	....	CVII
			Jun 14, 37	8.6, 10.4	10 41.2 E	....	....	9.1, 9.9	.34962	28	....	WCP
			Jun 15, 37	....	....	....	....	8.8, 9.5	.34972	28	....	WCP
			Jun 16, 37	8.3-11.5 (4)	10 42.1 E	....	....	9.0, 9.7	.34998	28	....	WCP
Apia Obs'y, S.E. Pier	13 48.4 S	188 14	Apr 18, 29	....	....	11.7-13.8(6)	30 05.7 S	....	....	...	EI 12	CVII
			Jun 19, 37	....	....	9.0-11.2(6)	30 30.0 S	....	....	...	EI 28	WCP
Apia Obs'y, Cedar Pier	13 48.4 S	188 14	Jun 11, 37	9.2, 11.6	10 39.6 E	....	....	9.9, 11.1	.34952	28	....	WCP
			Jun 12, 37	8.7, 10.4	10 40.8 E	....	....	9.2, 10.0	.34940	28	....	WCP
			Jun 13, 37	8.9, 10.4	10 40.6 E	....	....	9.3, 10.0	.34938	28	....	WCP
			Jun 17, 37	....	....	9.2-11.5(6)	30 27.8 S	....	....	...	EI 28	WCP
			Jun 18, 37	....	....	8.2-10.5(6)	30 28.4 S	....	....	...	EI 28	WCP
			Jun 19, 37	....	....	8.7-11.4(6)	30 27.9 S	....	....	...	EI 28	WCP

Society Islands

Station	Latitude	Long. East of Gr.	Date	Decl. LMT	Decl. Value	Incl. LMT	Incl. Value	Hor. Int. LMT	Hor. Int. Value	Mag'r	Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Papeete, A	17 31.8 S	210 27	Sep 30, '37	15.5, 16.1	9 45.8 E	....	....	....	....	28	....	WCP
			Oct 1, 37	8.8, 10.1	9 39.8 E	8.5, 10.4	30 05.2 S	9.2, 9.8	.32844	28	EI 28	WCP
			Oct 1, 37	14.3, 15.4	9 47.5 E	13.9, 16.0	30 01.0 S	14.6, 15.1	.32836	28	EI 28	WCP
Papeete, B, Secondary	17 31.8 S	210 27	Oct 7, 37	15.8, 16.6	9 39.8 E	....	....	....	....	28	....	WCP
Motu-Uta Island	17 32.3 S	210 26	Oct 12, 37	10.7-13.3 (4)	11 33.0 E	10.4, 13.9	29 51.2 S	12.5, 13.0	.32631	28	EI 28	WCP
Taravao, A	17 44.0 S	210 42	Oct 5, 37	13.3, 14.6	11 24.4 E	12.9, 15.4	30 10.2 S	13.6, 14.2	.33940	28	EI 28	WCP
Taravao, B	17 44.0 S	210 42	Oct 6, 37	9.2, 10.0	11 25.6 E	8.4, 10.5	30 11.7 S	9.4, 9.7	.33838	28	EI 28	WCP
Tautira, A	17 44.3 S	210 52	Oct 4, 37	9.6, 10.7	12 19.5 E	9.0, 11.1	32 02.2 S	9.9, 10.4	.33045	28	EI 28	WCP
Tautira, B	17 44.3 S	210 52	Oct 4, 37	12.6, 13.6	12 25.0 E	12.2, 14.3	32 01.6 S	12.8, 13.4	.33032	28	EI 28	WCP

ISLANDS, PACIFIC OCEAN

Solomon Islands

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Teopasino	5 39.2 S	155 07	Oct 8, '36	9.0, 9.4	7 05.5 E	....	....	....	....	28	....	WCP
Numa-Numa	5 50.1 S	155 13	Oct 7, 36	....	....	14.4, 15.8	23 10.3 S	15.0, 15.4	.36655	28	EI 28	WCP
Faisi Island	7 04.5 S	155 53	Oct 6, 36	7.8, 8.7	6 55.0 E	7.5, 8.9	25 33.5 S	8.0, 8.5	.36670	28	EI 28	WCP
Maringe Lagoon	8 05.0 S	159 31	Oct 3, 36	7.9	7 24.4 E	7.5, ...	26 44.1 S	8.2	.36534	28	EI 28	WCP
Gizo Island	8 06.0 S	156 52	Oct 5, 36	9.7-12.2 (4)	6 59.1 E	9.3, 12.4	26 53.2 S	10.1, 11.0	.36600	28	EI 28	WCP
Makambo Island	9 04.9 S	160 10	Sep 28, 36	10.8-14.7 (4)	7 41.0 E	10.5, 12.6	28 25.3 S	11.1, 12.0	.36430	28	EI 28	WCP

ANTARCTICA

Station	Latitude	Long. East of Gr.	Date	Declination LMT	Declination Value	Inclination LMT	Inclination Value	Hor. Intensity LMT	Hor. Intensity Value	Instruments Mag'r	Instruments Incl'r	Obs'r
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Donald Woodward Mountain	77 28.6 S	213 14	Nov 17, '34	16.7, 21.0	85 06.6 E	18.4-19.2(3)	79 52.1 S	19.2	.11569	222	222.1278	S-W
Mount Grace McKinley	77 54.5 S	211 49	Nov 6, 34	15.8, 20.8	81 10.4 E	18.2-18.8(3)	79 20.1 S	19.2	.12257	222	222.1278	S-W
Marie Byrd Land, PP 14	78 23.1 S	207 47	Dec 17, 34	18.9, 21.1	93 19.0 E	20.1	80 31.5 S	20.2	.10862	241	241.1234	EHB
King Edward VII Land, PP 16	78 23.2 S	204 10	Dec 31, 34	1.3, 4.9	96 30.8 E	2.9, 3.3	80 58.1 S	3.1	.11646	222	222.1278	EHB
Marie Byrd Land, PP 15	78 26.5 S	206 39	Dec 26, 34	13.8, 18.6	94 07.4 E	15.9	80 33.1 S	16.2	.10853	241	241.3456	EHB
			Dec 26, 34	20.6, 23.6	94 04.6 E	22.4	80 35.4 S	22.4	.10802	222	222.5678	EHB
King Edward VII Land, PP 16 A	78 27. S	205 29	Dec 30, 34	1.3	94 08.0 E	2.2	80 54.5 S	....	....	222	222.56	EHB
Marie Byrd Land, PP 13	78 33.6 S	209 30	Dec 14, 34	8.3, 11.4	92 27.5 E	9.2, 9.5	80 34.0 S	9.2	.10786	241	241.1234	EHB
Little America II, Base	78 34.1 S	196 04	Feb 27, 34	17.7	106 34.7 E	....	....	....	....	21	....	EHB
			Mar 2, 34	14.9	106 54.3 E	21.9, 23.9	81 59.6 S	17.4	.09400	21	21.12	B-Z
			Mar 3, 34	3.5	106 30.6 E	....	....	2.8, ...	.09351	21	....	B-Z
			Mar 9, 34	15.8	106 57.8 E	21.6, 22.6	82 00.0 S	17.8	.09459	21	21.12	B-Z
			Mar 10, 34	1.3	106 21.4 E	....	....	0.5	.09360	21	....	B-Z
			Mar 15, 34	18.3	106 34.8 E	....	....	....	....	21	....	B-Z
			Mar 17, 34	12.3	106 35.8 E	....	....	....	....	21	....	B-Z
			Mar 18, 34	14.7, 22.3	106 34.1 E	19.3, 19.4	81 55.3 S	15.8, 22.5	.09377	21	21.13	B-Z
			Mar 18, 34	....	....	19.5	81 53.9 S	....	....	...	21.2	EHB
			Mar 24, 34	12.2	107 22.5 E	....	....	....	....	21	....	B-Z
			Mar 25, 34	20.4	106 26.0 E	....	....	21.8	.09386	21	....	B-Z
			Mar 26, 34	5.1	106 33.1 E	1.2, 1.3	81 57.7 S	4.2	.09354	21	21.12	B-Z
			Apr 2, 34	14.3, 22.7	106 30.2 E	19.3, 20.0	81 57.5 S	15.6, 22.1	.09374	21	21.123	B-Z
			Apr 9, 34	9.8, 16.4	106 32.0 E	13.8	81 55.2 S	11.5, 16.0	.09391	21	21.12	B-Z
			Apr 14, 34	8.9, 17.1	106 30.1 E	13.4	81 54.2 S	10.4, 16.3	.09410	21	21.1	B-Z
			Apr 23, 34	9.9, 18.2	106 48.8 E	14.7	81 56.0 S	11.0, 17.5	.09408	21	21.123	B-Z
			Apr 28, 34	14.2, 19.8	106 30.0 E	17.5	81 55.5 S	13.2, 19.2	.09403	21	21.12	B-Z
			May 7, 34	13.4, 20.5	106 40.2 E	18.8	81 55.4 S	15.7, 17.1	.09416	21	21.12	B-Z
			May 14, 34	14.8, 19.6	106 29.4 E	17.5	81 56.4 S	15.5, 19.2	.09418	21	21.12	B-Z
			May 19, 34	13.3, 17.5	106 35.6 E	14.8	81 56.0 S	12.9, 16.7	.09414	21	21.12	B-Z
			May 27, 34	16.2, 20.7	106 23.7 E	18.4	81 55.2 S	16.7, 20.2	.09429	21	21.12	B-Z

ANTARCTICA

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	°	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Little America II, Base --concluded	78 34.1 S	196 04	Jun 3, '34	15.1, 21.8	106 28.8 E	19.1, 19.4	81 56.2 S	16.0, 21.4	.09412	21	21.36	B-Z
			Jun 10, 34	20.2, 22.2	106 29.2 E	22.8	81 57.4 S	19.8, 24.6	.09390	21	21.12	B-Z
			Jun 16, 34	15.7, 20.4	106 29.5 E	18.0	81 55.0 S	16.3, 20.0	.09428	21	21.12	AAZ
			Jun 25, 34	15.5, 19.8	106 30.4 E	17.4	81 55.0 S	16.0, 19.0	.09424	21	21.12	AAZ
			Jun 30, 34	13.5, 18.6	106 32.4 E	16.6	81 57.4 S	14.7, 17.0	.09438	21	21.12	AAZ
			Jul 9, 34	12.6, 18.7	106 33.1 E	16.1	81 55.6 S	13.2, 18.2	.09430	21	21.12	AAZ
			Jul 16, 34	12.1, 17.1	106 30.8 E	14.8	81 55.4 S	12.9, 16.7	.09431	21	21.12	AAZ
			Jul 22, 34	15.5, 18.2	106 30.0 E	17.7	81 53.2 S	16.0, 19.8	.09432	21	21.12	AAZ
			Aug 3, 34	15.3, 20.9	106 22.9 E	17.2	81 46.6 S	15.7, 20.4	.09436	21	21.36	AAZ
			Aug 11, 34	13.8, 21.9	106 34.2 E	18.0, 18.3	81 54.3 S	14.2, 21.5	.09434	21	21.123	B-Z
			Aug 19, 34	0.2, 5.2	106 37.4 E	2.8	81 59.0 S	0.8, 4.7	.09396	21	21.12	AAZ
			Aug 25, 34	13.8, 20.4	106 36.5 E	18.3	81 53.9 S	16.7, 20.0	.09436	21	21.12	B-Z
			Sep 5, 34	14.4, 19.6	106 35.8 E	17.2	81 53.4 S	15.8, 19.2	.09429	21	21.123	B-Z
			Sep 10, 34	12.9, 17.3	106 37.6 E	15.9	81 53.0 S	14.6, 16.9	.09458	21	21.12	B-Z
			Sep 14, 34	13.2, 17.8	106 35.0 E	15.9	81 53.9 S	14.5, 17.4	.09448	21	21.12	AAZ
			Sep 24, 34	11.5	107 08.3 E	....	....	....	....	21	....	AAZ
			Sep 26, 34	11.9	106 34.5 E	....	....	....	....	21	....	AAZ
			Sep 28, 34	10.8, 15.2	106 34.8 E	12.3	81 51.6 S	11.2, 14.7	.09519	21	21.12	AAZ
			Oct 5, 34	12.2, 16.2	106 35.1 E	14.4	81 55.5 S	12.8, 16.1	.09465	21	21.12	AAZ
			Oct 12, 34	12.0, 16.3	106 57.2 E	14.6	81 52.6 S	12.6, 15.8	.09446	21	21.12	AAZ
			Oct 19, 34	12.1, 16.0	106 37.8 E	14.4	81 51.9 S	12.5, 15.6	.09468	21	21.12	AAZ
			Oct 21, 34	....	....	....	....	15.2	.09468	21	....	AAZ
			Oct 27, 34	14.5, 17.8	106 46.0 E	16.4	81 52.2 S	15.2, 17.4	.09500	21	21.12	AAZ
			Nov 2, 34	12.2, 16.4	106 33.0 E	14.6	81 51.3 S	13.0, 16.0	.09486	21	21.12	AAZ
			Nov 9, 34	11.6, 17.9	106 30.7 E	16.4	81 49.2 S	15.2, 17.5	.09485	21	21.12	AAZ
			Nov 16, 34	14.7, 17.9	106 36.0 E	16.3	81 51.9 S	15.1, 17.5	.09491	21	21.12	AAZ
			Nov 23, 34	11.4, 16.0	106 29.4 E	14.3	81 51.3 S	11.8, 15.5	.09498	21	21.12	AAZ
			Dec 6, 34	12.7, 16.8	106 48.4 E	15.2	81 51.0 S	14.2, 16.4	.09516	21	21.12	AAZ
			Dec 13, 34	12.0, 15.6	106 33.0 E	14.2	81 51.6 S	12.4, 15.3	.09496	21	21.12	AAZ
			Dec 20, 34	5.3	106 42.8 E	....	....	....	....	21	....	AAZ
			Dec 24, 34	11.0	106 17.6 E	....	....	....	....	21	....	AAZ
			Dec 26, 34	11.9	106 15.6 E	....	....	....	....	21	....	AAZ
			Dec 27, 34	10.9, 16.0	106 30.4 E	12.5	81 48.3 S	11.5, 15.2	.09512	21	21.12	AAZ
			Jan 3, 35	12.3	106 21.4 E	....	....	....	....	21	....	AAZ
			Jan 5, 35	11.8, 16.4	106 38.1 E	15.0	81 50.4 S	12.1, 16.1	.09503	21	21.12	AAZ
			Jan 10, 35	14.5, 17.4	106 39.8 E	16.0	81 45.8 S	14.9, 17.0	.09520	21	21.12	B-Z
			Jan 18, 35	12.1, 16.0	106 31.3 E	14.6	81 45.4 S	12.4, 15.6	.09507	21	222.125	B-Z
			Jan 26, 35	15.3, 18.5	106 35.7 E	17.0	81 48.1 S	15.7, 18.1	.09520	21	222.1256	B-Z
			Feb 2, 35	9.7, 13.0	106 43.8 E	11.8	81 49.7 S	10.6, 12.6	.09404	21	222.12	B-Z
Little America I[y]	78 35 S	196 12	May 2, 29	....	....	22.1	82 22.0 S	....	....	...	242.56	FTD
			May 2, 29	....	....	22.0	82 21.4 S	22.0	.09043	...	242.18	FTD
			May 14, 29	....	....	16.2	82 19.6 S	....	....	...	242.12	FTD
			May 14, 29	....	....	16.4	82 18.0 S	16.3	.09080	...	242.34	FTD
			May 31, 29	....	....	15.4	82 19.2 S	....	....	...	242.56	FTD

[y] Declination from compass attachment of dip circle 242, and horizontal intensity from total-intensity observations with the same dip circle.

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	° ′	h h	c.g.s.			
Little America I[y] --continued	78 35 S	196 12	May 31, '29	....	....	15.4	82 17.3 S	15.4	.09034	...	242.18	FTD
			Jun 17, 29	....	....	14.8	82 19.4 S	....	....	...	242.12	FTD
			Jun 17, 29	....	....	14.9	82 21.2 S	14.8	.08982	...	242.34	FTD
			Jul 1, 29	....	....	14.5	82 30.2 S	....	....	...	242.56	FTD
			Jul 1, 29	....	....	14.0	82 23.5 S	14.7	.08972	...	242.18	FTD
			Jul 17, 29	....	....	15.6	82 18.7 S	....	....	...	242.12	FTD
			Jul 17, 29	....	....	15.5	82 14.7 S	15.5	.09070	...	242.34	FTD
			Aug 1, 29	....	....	14.6	82 17.0 S	....	....	...	242.56	FTD
			Aug 1, 29	....	....	14.7	82 17.2 S	14.7	.09009	...	242.18	FTD
			Aug 15, 29	....	....	13.6	82 21.8 S	....	....	...	242.12	FTD
			Aug 15, 29	....	....	13.5	82 19.0 S	13.6	.09028	...	242.34	FTD
			Aug 29, 29	....	....	14.1	82 19.3 S	....	....	...	242.56	FTD
			Aug 29, 29	....	....	14.1	82 20.4 S	14.1	.08909	...	242.18	FTD
			Sep 17, 29	....	....	13.5	82 17.3 S	....	....	...	242.12	FTD
			Sep 17, 29	....	....	13.6	82 11.6 S	13.6	.09149	...	242.34	FTD
			Oct 3, 29	....	....	13.5	82 16.0 S	....	....	...	242.56	FTD
			Oct 3, 29	....	....	13.5	82 18.7 S	13.6	.08961	...	242.18	FTD
			Oct 15, 29	....	....	13.8	82 17.0 S	....	....	...	242.12	FTD
			Oct 15, 29	....	....	13.8	82 09.7 S	13.8	.09159	...	242.34	FTD
			Nov 1, 29	11.7	107 09.7 E	13.8	82 19.2 S	....	....	242	242.56	FTD
			Nov 1, 29	15.7	107 21.9 E	13.9	82 18.2 S	13.8	.09065	242	242.18	FTD
			Nov 15, 29	11.7	107 07.1 E	13.9	82 19.4 S	....	....	242	242.12	FTD
			Nov 15, 29	15.8	107 15.6 E	13.8	82 18.9 S	13.9	.09003	242	242.34	FTD
			Dec 2, 29	11.6	106 44.7 E	13.7	82 14.9 S	....	....	242	242.56	FTD
			Dec 2, 29	15.4	106 28.1 E	13.8	82 18.2 S	13.8	.08971	242	242.18	FTD
			Dec 16, 29	11.8	107 18.4 E	13.8	82 16.0 S	....	....	242	242.12	FTD
			Dec 16, 29	15.7	106 49.4 E	13.8	82 12.2 S	13.8	.09160	242	242.34	FTD
			Jan 2, 30	11.5	106 56.0 E	13.6	82 14.3 S	....	....	242	242.56	FTD
			Jan 2, 30	15.3	106 41.8 E	13.5	82 21.2 S	13.6	.08854	242	242.18	FTD
			Jan 3, 30	13.2, 15.0	107 02.4 E	....	....	....	....	8	....	FTD
			Jan 3, 30	15.5, 16.2	107 13.0 E	....	....	....	....	8	....	FTD
			Jan 4, 30	11.3	105 59.8 E	....	....	12.9	.09077	8	....	FTD
			Jan 8, 30	12.3, 17.5	106 46.4 E	....	....	15.4, 16.9	.09069	8	....	FTD
			Jan 9, 30	12.3, 13.2	106 46.0 E	....	....	....	....	8	....	FTD
			Jan 9, 30	14.6, 15.5	106 39.8 E	....	....	....	....	8	....	FTD
			Jan 9, 30	12.8, 15.1	106 40.4 E	....	....	....	....	242	....	FTD
			Jan 15, 30	11.1, 14.7	106 32.6 E	13.0	82 10.0 S	....	....	242	242.12	FTD
			Jan 15, 30	....	....	13.0	82 08.5 S	13.0	.09218	...	242.34	FTD
			Jan 21, 30	14.7, 18.1	106 56.5 E	....	....	15.6, 17.4	.09083	8	....	FTD
			Jan 24, 30	10.8, 13.8	106 33.2 E	12.4	82 13.2 S	....	....	242	242.56	FTD
			Jan 24, 30	....	....	12.4	82 14.3 S	12.4	.09029	...	242.18	FTD
			Jan 31, 30	11.5, 15.4	107 02.2 E	....	....	12.3, 14.8	.09111	8	....	FTD
			Feb 1, 30	11.6, 15.1	107 20.6 E	13.4	82 14.8 S	....	....	242	242.56	FTD
			Feb 1, 30	....	....	13.4	82 20.0 S	13.4	.08926	...	242.18	FTD

[y] Declination from compass attachment of dip circle 242, and horizontal intensity from total-intensity observations with the same dip circle.

ANTARCTICA

Station	Latitude	Long. East of Gr.	Date	Declination		Inclination		Hor. Intensity		Instruments		Obs'r
				LMT	Value	LMT	Value	LMT	Value	Mag'r	Incl'r	
	° ′	° ′		h h h	° ′	h h	°	h h	c.g.s.			
Little America I[y] --concluded	78 35 S	196 12	Feb 7, '30	19.9, 22.8	106 54.4 E	21.4	82 16.4 S	....	....	242	242.12	FTD
			Feb 7, 30	....	....	21.4	82 15.4 S	21.4	.09095	...	242.34	FTD
			Feb 8, 30	10.8	106 27.0 E	....	....	....	....	8	....	FTD
Ross Ice Shelf, PP 17	78 34.5 S	200 04	Jan 1, 35	9.8, 12.4	102 13.8 E	11.0, 11.1	81 23.6 S	11.1	.09899	222	222.5678	EHB
Ross Ice Shelf, PP 1A	78 43.6 S	196 04	Oct 12, 34	18.8	106 59.9 E	....	....	....	....	241	....	EHB
Marie Byrd Land, PP 12	78 48.8 S	209 27	Dec 13, 34	18.7, 22.8	93 37.8 E	20.6, 20.9	80 08.7 S	20.7	.11263	241	241.1234	EHB
Marie Byrd Land, PP 11	79 00.7 S	209 36	Dec 10, 34	14.1, 17.4	94 15.8 E	15.9, 16.2	80 01.0 S	16.1	.11282	241	241.1278	EHB
Marie Byrd Land, PP 10	79 16.7 S	211 00	Dec 3, 34	13.0, 16.7	94 37.6 E	15.1, 15.4	79 55.9 S	15.4	.11293	241	241.1278	EHB
			Dec 4, 34	14.7	94 00.0 E	....	....	....	....	241	....	EHB
Little America, 57 miles south, PP 1	79 29.1 S	196 41	Oct 22, 34	11.3	110 21.2 E	13.0	89 29.3 S	....	....	241	241.12	EHB
RossDependency, PP 9	79 39.0 S	210 27	Nov 29, 34	12.8, 15.4	95 48.5 E	14.3	79 58.3 S	14.2	.11282	241	241.1278	EHB
Ross Ice Shelf, PP 2	80 06.9 S	196 06	Oct 24, 34	13.6, 20.0	114 24.2 E	16.6, 18.8	81 18.2 S	18.8	.09932	241	241.1278	EHB
RossDependency, PP 8	80 27.0 S	210 56	Nov 24, 34	17.7, 21.7	98 35.4 E	19.9	79 48.1 S	20.3	.11451	241	241.1278	EHB
RossDependency, PP 7	80 29.4 S	208 27	Nov 22, 34	13.7	101 37.3 E	18.1, 18.2	80 01.7 S	18.2	.11378	241	241.1234	EHG
RossDependency, PP 6	80 37.5 S	202 48	Nov 19, 34	19.0	108 28.3 E	17.7, 17.8	80 33.2 S	17.7	.10701	241	241.5678	EHB
			Nov 20, 34	20.7, 21.3, 23.2	108 29.8 E	....	....	....	....	241	....	EHB
Carmen Land, PP 3	80 51.9 S	198 11	Oct 30, 34	11.5, 13.0	115 03.6 E	14.3	80 57.0 S	....	....	241	241.1	EHB
RossDependency, PP 5	81 06.3 S	202 32	Nov 3, 34	15.2	111 16.4 E	20.4, 20.5	80 37.2 S	20.3	.10579	241	241.5678	EHB
Carmen Land, PP 4	81 09.6 S	198 55	Nov 4, 34	15.7, 19.5	114 45.2 E	17.8, 18.1	80 38.3 S	17.8	.10730	241	241.3456	EHB

[y] Declination from compass attachment of dip circle 242, and horizontal intensity from total-intensity observations with the same dip circle.

DESCRIPTIONS OF STATIONS

Because of the frequent occurrence of local disturbances, relatively exact reoccupations of stations are usually essential so that reliable determinations of magnetic secular change be obtained. In many regions it is very difficult for an observer seeking repeat observations to locate the same spot years afterwards. It is therefore important that the descriptions of the sites of stations be sufficiently specific. The descriptions of stations in the present volume, prepared mainly for the benefit of future observers, provide necessary data for those desirous of reoccupying the stations. More detailed information in the form of station sketches and photographs will be gladly furnished those wishing to reoccupy the stations.

The descriptions are arranged in alphabetical order in conformity with the geographical divisions adopted in the Table of Results. The information is given in the following order: name of station, year, general location, detailed location, distances and references to surrounding objects, manner of marking, and finally the bearings of prominent objects likely to be of permanent character. Unless stated otherwise, the bearings are true and reckoned continuously from 0° to 360°, in the directions south, west, north, and east. In the case of some expeditions, for special reasons, adequate descriptions were not obtained by the observers and hence cannot be included. When a station was not marked for future reoccupation, no reference is made to the marking of a station. Estimates of distances between objects, usually only very approximate, are given in the metric system, and shown in parentheses are the values converted from estimates actually made using the English system.

AFRICA

Algeria

Algiers, 1935.--On the ground of the Bouzareah Observatoire d'Alger. Exact reoccupation of station O of 1922, at pier "O" of the observatory, in the northwest part of observatory grounds, about 65 yards (60 meters) distant from nearest building and covered or sheltered by a wooden shed. True bearing: Matifau lighthouse, 265° 28'.5 (from previous observations).

Anglo-Egyptian Sudan

Gondokoro, Mongala, 1934.--Close reoccupation of CIW station of 1909 and 1918, on high right bank of Nile on site of old government station of Gondokoro, about 300 yards (274 meters) north of native village of same name; 10 yards (9 meters) east of riverbank, 12 yards (11 meters) southwest of large thorn tree growing beside pile of old brick, about 250 yards (229 meters) southwest of the mission church; station not marked. True bearings: prominent cliff on hill, 60° 36'.1; small hut on west bank of Nile, 104° 17'.3; base of cross on mission church, 230° 58'.5; junction of steel telegraph pole with its stay, 256° 47'.8.

Port Sudan, 1935.--Exact reoccupation of CIW station of 1918. About 1.25 miles (2 kilometers) north of Port Sudan Harbor, 160 feet (49 meters) south-southeast of the pit of a rifle range. Marked by concrete monument 12 by 12 by 48 inches (30 by 30 by 122 centimeters), set so that it projects 10 inches (25 centimeters) aboveground. True bearings: tip of large water tank, 15° 19'.2; lightning rod on smokestack at powerhouse, 24° 23'.7; spike at center of second water tank, 55° 24'.4; permanent navigation guide at sea, 284° 23'.8; tip of lighthouse at entrance to harbor, 358° 30'.5.

Angola

Boma, Moxico, 1927.--Two stations were occupied. A was exact reoccupation of CIW station of 1920, at English Mission station about 40 kilometers southeast of Villa Lugo railroad station, about 12 kilometers east of old Moxico, near center of strip of clearing south of main road and mission residence, 6.15 meters north of group of five small acacia trees, and 10.40 meters southwest of two small acacia trees; marked by pillar of white bricks with base 60 centimeters square and 20 centimeters high with upper part 35 centimeters square and 30 centimeters high. True bearings: station B, 115 paces, 78° 57'.8; east gable of straw roof of schoolhouse, 60 meters, 94° 57'.6; east gable of straw roof of Aiston's residence, 143° 56'.2; center of large tree, 39.7 meters, 159° 11'.4; west gable of straw roof of Griffith's residence, 183° 06'.0; tip of native granary, 200 meters, 333° 49'.2; west post under eave of native house, 200 meters, 340° 48'.8.

B was 115 paces west of A on grounds of English Mission, south of main road and mission residences, directly opposite center of Maitland residence, 41.35 meters southeast of southeast corner of mission church, 28.00 meters southwest of southwest corner of mission school; marked by pillar of white bricks 50 centimeters square at surface of ground with upper part 30 centimeters square and 30 centimeters high. True bearings: tree with white bark across valley, 2 kilometers, 27° 42'.3; southwest corner of mission church, 112° 56'.4; west gable of straw roof of Maitland residence, 156° 29'.0; station A, 115 paces, 258° 57'.8.

Chinguar, 1927.--Two stations were occupied. A was practical reoccupation of CIW station Chinguar of 1915, and proximate reoccupation of CIW station Xinguari of 1920, on open veldt about 250 meters southeast of railroad station, south of fourth road parallel to and south of railroad, exactly in line with walls on west side of first road east of railroad station perpendicular to railroad, 32.95 meters south of southeast corner of nearest of these walls, 27.95 meters south of center of fourth parallel road, 12.50 meters west of northmost native hut to east, and 6.72 meters east of southmost of three round holes from which clay was taken for making bricks; marked by tent peg driven flush with surface of ground. True bearings: cross on tomb of native chief, 1 kilometer, 27° 10'.1; steel telegraph pole along railroad, 2 kilometers, 76° 52'.9; steel telegraph pole east of railroad station, 250 meters, 153° 23'.1; southwest corner of Portuguese trader's store, 125 meters, 225° 33'.2.

B was about 225 meters east of A, on open veldt, about 250 meters south of government school, 14.55 meters east of center of path leading to native village to southeast, 30.0 meters south of center of road where it branched into two roads leading eastward from Chinguar, and 4.80 meters west of lone granite rock 1 meter high; marked by bullet-shaped native stone with sharp point extending 8 inches (20.3 centimeters) above surface of ground. True bearings: cross on tomb of native chief, 1.5 kilometers, 39° 50'.3; southwest corner of Portuguese trader's store, 175 meters, 87° 33'.1; southeast corner of house, 50 meters, 138° 30'.4; tip on roof of small spectator's stand at east end of football field, 250 meters, 180° 02'.0.

Chissamba, Bie, 1927.--Two stations were occupied. A was exact reoccupation of CIW station of 1920, on premises of American Board Mission, in open space across road east of ladies' residence, east of old tennis court, west of two old saw pits, and 16.0 meters south of center of path to east gate entrance to ladies' residence; arrangements were made for marking station by brick and cement pier with usual inscription. True bearings: southeast corner of mud wall around ladies' residence compound, 54.2 meters, 22° 59'.1; southeast corner of girls' home building, 125 meters, 41° 44'.9; northeast corner of main part of ladies' annex building, 91° 41'.9; north gatepost near ladies' residence, 93° 50'.5; southeast corner of boys' home foundation, 60 meters, 145° 31'.5; southwest edge of red mud house under construction across valley, 2 kilometers, 291° 37'.5.

B was about 300 meters west of A, on west side of residence compound of mission, west of tennis court in front of Steed's bungalow, 15.8 meters south of center of path running east and west in front of Steed's bungalow, 11.4 meters east of west wall around compound, 2.6 meters southeast of low stump, and 2.0 meters north of tall tree; marked with tent peg driven flush with surface of ground. True bearings: front gable of Steed's bungalow, 90 meters, 218° 58'.2; center of chimney on ladies' residence, 200 meters, 267° 27'.4; west edge of chimney on girls' home, 200 meters, 296° 07'.6.

Cuanza, 1927.--Close reoccupation of CIW station of 1920, at government post on east bank of Cuanza River

Angola--continued

in open space south of post and north of main road, 77 paces west of large tree on south side of main road, 9.20 meters north of center of main road, 33.95 meters southeast of lone guava tree, and 42.55 meters south of southwest corner of nearest small building of post; marked by tent peg driven flush with surface of ground. True bearings: telegraph pole, 200 meters, 48° 30'.6; south edge of door to administrator's office, 70 meters, 203° 23'.4; base of flagstaff in front of office, 40 meters, 215° 17'.3.

Cuanza Station, 1927.--About 9 miles (15 kilometers) south-southeast of magnetic station Cuanza, just west of Cuanza railroad bridge on top of rise south of railroad, south of main road and west of concrete tennis court, 11.50 meters west of northwest corner of tennis court and in line with its north side, and 15.70 meters east of northeast corner of wooden fence around railroad bungalow; marked by concrete pillar 12 by 12 by 30 inches (30 by 30 by 76 centimeters) extending 10 inches (25 centimeters) above surface of ground and bearing the inscription "CIW 1927," with cross in center indicating the exact point. True bearings: steel telegraph pole, 90 meters, 137° 37'.3; west top edge of railroad water tank, 275 meters, 176° 52'.1; west gable of railroad station, 325 meters, 202° 06'.9; west post supporting tennis net, 20.00 meters, 322° 14'.9.

Huambo, 1927.--Two stations were occupied. A was close reoccupation of CIW stations of 1915 and of A of 1920, on hillside about 200 meters southeast of railroad station, about 35 meters southeast of intersection of road perpendicular to railroad with third parallel road from railroad station, exactly in line with outer face of high wall bounding northeast side of Portuguese trader's property along perpendicular road and with outer face of rock foundation for house on perpendicular road but on opposite side of third parallel road from high wall, about 10 meters west of center of perpendicular road, 9.35 meters east of inside southeast corner of rock foundation. True bearings: wireless mast, 1.6 kilometers, 30° 15'.0; eastmost gable of two on white house, 100 meters, 71° 33'.7; outside southeast corner of rock foundation, 8.35 meters, 140° 40'.9; southeast corner of high wall bounding Portuguese trader's property, 140° 40'.9; eastmost of four gables on store of Coelho and Coelho, 150 meters, 161° 11'.8.

B was close reoccupation of CIW station B of 1920, about 1.5 kilometers east of railroad station, north of railroad, on bushy hillside north of bungalow of resident engineer, 10 meters east of westmost path at point 75 paces north of small concrete outbuilding of resident engineer, 1.0 meter west of central path at point 75 paces north of same outbuilding, and 12.0 meters south of intersection of central path with path running parallel to valley; marked by circular mound of stone and loose earth, 1.0 meter in diameter, sharp-pointed stone in center 6 inches (15.2 centimeters) high indicating exact point. True bearings: east gable of inspector's bungalow, 400 meters, 54° 28'.7; northeast corner of resident engineer's concrete garage, 80 meters, 308° 20'.2; north gable of resident engineer's bungalow, 100 meters, 333° 41'.2.

Kangonga, 1927.--On south side of Benguela railroad at kilometer 879, on bushy flat plain about 200 meters south of line of railroad, 7.40 meters south of largest tree with "CIW" cut in bark on south side, and 6.80 meters northwest of another tree; to be marked with concrete pillar. True bearing: east gable on railroad station, 250 meters, 116° 54'.7.

Loanda, 1927.--Exact reoccupation of CIW station of 1914, 1915, 1916, 1920, on property of American Mission, near edge of cliff overlooking railroad, and 24.45 meters north of northwest corner of concrete veranda on west side of most northerly of mission buildings; marked by cross cut in top of concrete block 20 by 25 centimeters with top face lettered "CIW 1915" and standing 6 centimeters above surface of ground. True bearings: signal staff at observatory, 2 kilometers, 89° 41'.3; flagstaff at fort, 2 kilometers, 114° 15'.7; chimney stack at gasworks, 3 kilometers, 217° 56'.7; north gable of mission church, 90 meters, 334° 49'.9.

Loanda, João Capello Observatory, 1927.--Close reoccupation of CIW station of 1920, in center of leveled ground at rear of observatory and gardens, very nearly on exact spot of former piers, piers and absolute house of 1920 having been destroyed; marked by slab of granite 4 by 12 by 18 inches (10 by 30 by 46 centimeters), set flush with surface of ground, cross in center indicating exact point. True bearings: tip on small summer house on bluff, 8° 21'.8; west side of Fort Miguel, 175° 56'.4; western vane on governor's palace, 328° 41'.4.

Lobito, B, 1927.--About 300 meters south of CIW station B of 1920, about 275 meters south of new railroad water tank, south of low wet ground, on seaside of main auto road to Benguela, 24.50 meters from center of this road, in line with north end of football field, in center of north and south path, and 5.65 meters south of intersection of this path with east and west path; marked by tent peg driven flush with surface of ground. True bearings: northeast corner of European hospital, 250 meters, 127° 42'.7; west edge of transformer house, 300 meters, 220° 47'.0; lighthouse on mainland, 10 kilometers, 241° 09'.1; tip on chimney of bakery, 400 meters, 291° 09'.3.

Malange, 1927.--Two stations were occupied. A was close reoccupation of CIW station of 1915 and 1920, in open square south of American Mission, west of government school and east of government hospital, 51.5 meters southwest of southeast corner of mission property, 25.75 meters west of northwest corner marker of government school lot, and 16.25 meters west of stone wall along west side of government school lot; marked by tent peg driven flush with surface of ground. True bearings: southwest corner of small blue building, 150 meters, 10° 54'.0; southwest corner of old mission home, 80 meters, 160° 26'.2; northwest corner of government school, about 22 meters, 254° 41'.3; southernmost of two flagstaffs on governor's palace, 0.5 kilometer, 295° 01'.3.

B was about 300 meters west of A, 0.8 kilometer west of railroad station, in open ground south of native market, northeast of cinema house and east of football field, in line with east side of market building and with south goal posts of east and west goals, 8.0 meters east of edge of excavation for football field, 23.75 meters north of near edge of rock-lined ditch south of football field, and 31.85 meters south of rock-lined ditch north of football field; marked by tent peg driven flush with surface of ground. True bearings: flagstaff on house at northwest corner of football field, 180 meters, 119° 13'.6; outer edge of southwest corner post of market place, 60 meters, 165° 13'.1; outer edge of southeast corner post of market square, 50 meters, 216° 09'.7; southwest corner of trading store, 45 meters, 308° 09'.3.

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Angola--concluded

Mossamedes, 1927.--Two stations were occupied. A was exact reoccupation of CIW station of 1915 and 1916, in enclosure southwest of English cable station and southeast of government wireless station, northeast of white house, southeast of main road to port, 22.9 meters from wall on northwest side of enclosure, 40.3 meters from wall on back (southeast) side of enclosure, and 40.3 meters from southwest wall of enclosure; marked by natural stone, small hole in top indicating exact point. True bearings: lower section of flagpole on fort, 58° 05′.4; flagpole on railroad depot, 61° 55′.4; signal staff on coast, 95° 51′.2; tip on cable relay house on beach; 182° 43′.4; ornament on roof of cable station, 209° 01′.8.

B was about 200 meters east of A, about 35 meters north of British Admiralty station of 1896, in enclosure of Eastern Telegraph Company, in center of open court south of main building of cable station, 39.65 meters from wall on northeast side, 40.35 meters from wall on southeast side, and 35.80 meters from concrete irrigation conduit; marked by concrete block 4 by 4 by 13 inches (10 by 10 by 33 centimeters) set flush with surface of ground, cross in top indicating exact point. True bearings: east gable of white house, 400 meters, 41° 49′.3; wireless mast, 350 meters, 77° 08′.2; southwest corner of main building of cable station, 115° 58′.0; southeast edge of bathhouse, 90 meters, 167° 50′.7.

Moxico, 1927.--Close reoccupation of CIW station of 1920, at old abandoned fort on top of hill, about 2 kilometers west of governor's former palace, in center of old earthwork around fort at south corner, 10.5 meters southeast of eastmost eucalyptus tree in most southern row of eight trees, 2.5 meters south of narrow path along south side of row of eucalyptus trees, and 9.95 meters southwest of center of road to old fort; marked by large white brick 15 by 15 by 35 centimeters set on end in ground and extending 10 centimeters above surface. True bearings: tip on native hut across valley, 2 kilometers, 50° 19′.4; east corner of northmost of old fort buildings, 173° 59′.0; south edge of northmost of old governor's buildings; 2 kilometers, 263° 54′.7; north veranda pillar of de Silva store, 1.2 kilometers, 294° 33′.0.

Belgian Congo

Banana, A, Lower Congo, 1927.--About 1 kilometer south of CIW station of 1920, about 125 meters south of post office, about 100 meters south of wharf, 3.0 meters west of best path parallel to lagoon, 4.0 meters south of open, rectangular brick platform; marked by triangulation pillar A of Belgian Hydrographic Service, with inscription "A, Sh, Bc, 1925," center of brass plate on top indicating exact point. True bearings: base of signal mast at pilothouse, 132° 21′; triangulation pillar B of Belgian Hydrographic Service, with inscription, "B, Sh, Bc, 1925," 500 meters, 156° 29′.2.

Basongo, Kasai, 1927.--Close reoccupation of CIW station of 1914, southwest of state post building, in north edge of small coffee plantation, 4.0 meters due south of small lone palm tree, and 3.3 meters southwest of coffee bush just east of palm; marked by tent peg driven flush with surface of ground. True bearings: southwest edge of southwest veranda pillar of new bureau, 125 meters, 177° 17′.1; bottom of north edge of window sill of small mud building with straw roof, 231° 49′.5.

Bogoro, Ituri, 1934.--About 0.25 mile (400 meters) south of the Lagora Hotel at the junction of the Nioka-Kasenty and Nioka-Gety roads, in center of small triangle of grass left between the Nioka-Bogoro-Gety road and the track to the protestant mission; station was not marked. True bearings: projection on south side of large tree, 150 yards (137 meters) distant, 137° 26′.8; Lagora trigonometric station, about 3 miles (4.8 kilometers) distant, 225° 36′.5; bisection of mission chimney, 0.25 mile (400 meters) distant, 289° 38′.9.

Bolobo, Middle Congo, 1927.-- Three stations were occupied. B was close reoccupation of CIW station B of 1916, about 50 meters north of landing place of steamers, on west edge of beach road parallel to river, and about 8 meters east of high-water mark, 7.0 feet (2.13 meters) north of center of walk leading to well on riverbank, 15.5 feet (4.72 meters) north of palm tree on south edge of walk to well, 10.1 feet (3.08 meters) from first palm tree north of walk to well, and 31.1 feet (9.48 meters) southwest of palm tree on east side of beach road; arrangements were made for marking station with concrete pillar with usual inscription. True bearings: brick fence pillar at northwest corner of Sedec concession, 60 meters, 183° 18′.8; concrete property marker at southwest corner of lot south of Sedec concession, 91.8 feet (27.98 meters), 279° 17′.7; outer edge of southwest veranda pillar of Sicomac magazine, 125 meters, 331° 49′.1.

D was about 250 meters north of B, between beach road and river, across beach road from industrial building of English Baptist Mission, and almost in line with south side of this building, 18.7 feet (5.70 meters) south of palm tree on edge of high bank, and 36.6 feet (11.16 meters) east of palm tree just off edge of high riverbank; arrangements were made for marking station with concrete pillar with usual inscription. True bearings: northwest edge of mission house nearest river to north, 100 meters, 176° 58′.6; northwest corner of mission press building, 50 meters, 222° 03′.3; southwest corner mission industrial building, 40 meters, 271° 44′.3.

E was in line from station B to outer edge of southwest veranda pillar of Sicomac magazine. True bearings: station B, 158.7 feet (48.37 meters), 151° 49′.1; Sicomac magazine, 75 meters, 331° 49′.1.

Boma, Lower Congo, 1927.--Two stations were occupied. A was about 20 meters southeast of CIW station of 1920 (not available for reoccupation in 1927 on account of being only about 2 meters from spur railroad track to brick factory), northeast of brick factory, on south side of raised footpath through swamp from depot to ice plant on river, 22.0 meters southeast of east track of spur railroad, measured from point where path crosses track; marked by tent peg driven flush with surface of ground. True bearings: north edge of chimney on residence of M. Dupont, 150 meters, 77° 18′.3; lamppost in front of Christian Missionary Alliance residence (formerly Dutch consulate), 0.8 kilometer, 110° 09′.0; flagstaff in front of governor's residence, 148° 55′.5; southeast corner of railroad depot, 200 meters, 150° 48′.0.

B was about 0.7 kilometer west of A, about 100 meters east of house No. 1 of Christian Missionary Alliance, on property of former Governor Lippens, on hill northwest of Christian Missionary Alliance Church, 13.5 meters northwest of concrete marker at northwest corner of

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church lot, and 7.4 meters south of small lone cottonwood tree. True bearings: eastmost front lamppost at governor's residence, 189° 22′.2, dome on governor's residence, 0.6 kilometer, 193° 04′.4; flagpole on store of Cominex, 0.6 kilometer, 350° 45′.4.

Bulape (Bakua N'Zeba), Kasai, 1927.--On property of American Presbyterian Congo Mission, on east edge of central grounds opposite and in front of mission church, 4.0 meters west of center of diagonal walk leading northeast to Washburn home, 8.2 meters southwest of palm tree west of diagonal walk, 7.5 meters west of palm tree east of diagonal walk. True bearings: southwest corner of mission magazine, 125 meters, 39° 13′.9; northwest corner of mission church, 100 meters, 73° 44′.6; northwest corner of Washburn home, 75 meters, 199° 44′.3.

Kissenyi, Ruanda, 1934.--On north shore of Lake Kivu about 1 mile (1.6 kilometers) west of Kissenyi and between Kissenyi and Ngoma, 5 feet (1.5 meters) south of the center of the track, 20 paces north of the lake shore, 41 paces toward Kissenyi from the east end of a ruined house north of the track, 57.8 feet (17.58 meters) from the center of a 6 by 6 inch (15 by 15 centimeter) concrete block projecting 4 inches (10 centimeters) aboveground, numbered 110, and 59.0 feet (17.98 meters) from a similar block to the east (not numbered). Station was not marked. True bearings: west edge of rim of crater of Namlagira, 20 miles (32 kilometers) distant, 182° 23′.9; cross cut on post bearing a notice "Corniche de Goma," 150 yards (137 meters), 290° 07′.3; northwest end of roof of house 400 yards (365 meters) distant, 297° 55′.8.

Kwamouth, Middle Congo, 1927.-- Close reoccupation of CIW station of 1914, west of lone government bungalow (formerly post and telegraph office), on south bank of Kasai River where it empties into Congo River, about 400 meters north of landing place for steamers on Congo River, and 8.5 meters west of light fence around government bungalow. True bearings: steel telegraph pole on north side of Kasai River, 1.4 kilometers, 185° 16′.4; steel telegraph pole on south side of Kasai River, 1.0 kilometer, 218° 38′.0; south gable of administrator's office, 349° 04′.0.

Leopoldville, Middle Congo, 1927.--Exact reoccupation of CIW station A of 1914 and 1916, on top of Mount Leopold just west of Leopoldville, over concrete pier known as "Signal Leo," 18 inches (45.7 centimeters) square and 3 feet (0.9 meter) high used for latitude and longitude observations and for triangulation, and 442 meters northwest of Stanley Place where Lemaire made observations. True bearings: cross on Catholic Church in Brazzaville, 8 kilometers, 203° 51′.0; lone wireless mast in Kinshasa, 4 kilometers, 249° 17′.9.

Luebo, Kasai, 1927.--Three stations were occupied. A was close reoccupation of CIW station of 1914, about 1.25 kilometers north of Lulua River, on grounds of American Presbyterian Mission, 100.0 feet (30.48 meters) west of central path leading to river, 72.5 feet (22.10 meters) east of diagonal path leading to Captain Scott's home, 74.0 feet (22.56 meters) north of tree, 150.4 feet (45.84 meters) southwest of south corner of cemetery; marked by stone with flat top set flush with surface of ground, cross in center indicating exact point. True bearings: east corner pillar of Captain Scott's home, 150 yards (137 meters), 13° 37′.6; east corner veranda pillar of mission hospital, 100 yards (91 meters), 44° 54′.4; station B, 90 paces, 101° 35′; east gable of mission press building, 100 yards (91 meters), 141° 13′.3; headstone on Mrs. Morrison's grave, 189° 52′.4; southwest corner of Hobson home, 150 yards (137 meters), 250° 15′.0; peg at station C, 125 paces, 256° 58′.0.

B was on property of American Presbyterian Mission, 40.5 feet (12.34 meters) northwest of center of main roadway, on southern edge of narrow path which is an extension of "west path," about 30 meters south of Shive's home, 19.4 feet (5.91 meters) southwest of northmost palm tree on northeast side of narrow path, 17.7 feet (5.39 meters) west of southmost palm tree northeast of narrow path, 18.5 feet (5.64 meters) north of mango tree, 29.7 feet (9.05 meters) west of mango tree, 28.0 feet (8.53 meters) southeast of mango tree. True bearings: northeast corner of guest's house, 80 meters, 104° 43′.8; east corner of Shive's home, 50 meters, 204° 06′.0; east corner of mission hospital, 100 meters, 339° 26′.2.

C was on grounds of American Presbyterian Mission, about 100 feet (30 meters) southwest of Hobson home, 41.6 feet (12.68 meters) south of center of path leading from Hobson home to central path, 10.5 feet (3.20 meters) south of small orange tree, 16.4 feet (5.00 meters) southwest of center of southeast segment of diagonal path, 29.4 feet (8.96 meters) west of center of "east path." True bearings: east corner of Captain Scott's home, 200 yards (183 meters), 51° 53′.5; peg at station A, 125 paces, 76° 58′.0.

Lusambo, Sankuru, 1927.--Two stations were occupied. A was about 2 meters south of CIW station of 1914, about 600 meters north of state river port, in mango grove west of Rue Royale, and southwest of house occupied by commandant of troops at Lusambo, between two rows of mango trees running south from street on which house of commandant faces, 11.2 meters southwest of second tree in eastern row, 14.1 meters southeast of second tree in western row; marked by round concrete block 1.0 foot (0.30 meter) in diameter and 1.25 foot (0.38 meter) long, set flush with surface of ground and lettered "CIW 1927," cross in center indicating exact point. True bearings: southwest veranda pillar of brick house, 160° 21′.7; north D'Obry meridian pillar, 57.0 meters, 255° 27′.7; northwest veranda pillar of Banque du Congo Belge, 100 meters, 322° 54′.3.

B was about 600 meters south of A, on spit of land on north bank of Sankuru River between river and Avenue Marine, about 100 meters northwest of state river beach, 17.7 meters south of center of Avenue Marine, 9.0 meters east of west edge of high riverbank, 10.7 meters north of south edge and 18.50 meters west of east edge of high bank; marked by tent peg driven flush with surface of ground. True bearings: smokestack on factory of Cotonco, 1.4 kilometers, 15° 48′.8; northmost wireless mast, 1.4 kilometers, 140° 04′.6; southwest veranda pillar of district commissioner's office, 100 meters, 183° 17′.0.

Matadi, Lower Congo, 1927.--Two stations were occupied. A was about 30 meters north of CIW station of 1920, which was unavailable on account of construction of bungalows for workmen on new railroad; on summit of rocky hill about 1 mile (1.6 kilometers) northeast of wharf, between Congo River and railroad line to Kinshasa, on level spot in rear of new railroad construction

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office, 13.15 meters northeast of northeast corner of this office, 16.75 meters south of southeast corner of concrete and steel shed, 12.85 meters west of northwest corner post of iron fence around chicken yard, 30.05 meters northwest of northwest corner of western of two water tanks, and about 5 meters northeast of 2.5 inch underground iron pipe water line. True bearings: steel telegraph pole on west bank of Congo River, 2 kilometers, 70° 34'.0; government survey marker on hill, 1 kilometer, 354° 06'.7; steel telegraph pole, 50 meters, 357° 22'.1.

B was about 2 kilometers south of A, about 250 meters south of CIW station of 1914, 0.67 kilometer east of wharf, on top of hill, between football field and cemetery, 4 meters north of middle of north side line of football field, 6.45 meters south of group of four papaw trees in south border of cemetery, 57.60 meters northwest of southeast concrete cornerstone of football field; marked by cement brick 10 by 10 by 20 inches (25.4 by 25.4 by 50.8 centimeters). True bearings: center of iron pin in southwest concrete cornerstone of football field, 53.30 meters, 57° 08'.6; iron cross on grave of William Meyer, 243° 58'.0; northeast corner of white house south of football field, 60 meters, 350° 46'.2.

Mushie, Lake Leopold II, 1927.--On north bank of Kasai River, about 200 meters northwest of Unatra river port, in north corner of triangle formed by two roads branching from same point in main road and leading southward to river, 4.5 meters from center of road to east which leads to Unatra beach, and 4.2 meters from center of road to west which leads to native market, about 125 meters northwest of concrete pillar of hydrographic survey; marked by tent peg driven flush with surface of ground. True bearings: west gable on roof of administrator's bungalow, 80 meters, 206° 50'.6; northeast corner of Unatra magazine, 100 meters, 278° 19'.2; flagpole on water front, 100 meters, 335° 18'.1.

Port Francqui (Hebo), Kasai, 1927.--Two stations were occupied. A was about 1.25 kilometers from river port, on public ground, northwest of administrator's office and post and telegraph office and on opposite side of street from latter, northeast of small enclosed public garden, 17.5 meters east of northeast corner of garden; marked by concrete block 0.5 by 0.7 by 1.5 feet (0.15 by 0.21 by 0.46 meter) set flush with ground surface, cross in center indicating exact point. True bearings: flagpole at wireless office, 300 meters, 185° 48'.9; steel telephone pole near administrator's bungalow, 34.5 meters, 196° 37'.1; main mast of wireless station, 400 meters, 241° 58'.9; steel telephone pole at southeast corner of garden, 33.0 meters, 337° 22'.9.

B was about 400 meters south of A, about 1.12 kilometer from river port, near southern edge of "La Place Leopold II," 3.4 meters west of center of central walk in "La Place," 11.5 meters southwest of lone palm tree, in line with two steel telegraph poles, on northern and southern edges, respectively, of "Avenue Emile Francqui," and 36.5 meters from the southern and nearer telegraph pole (azimuth given below); marked by tent peg driven flush with surface of ground. True bearings: northeast corner of metal bungalow, 100 meters, 110° 51'.9; steel telegraph pole on south edge of "Avenue Emile Francqui," 36.5 meters, 158° 16'.2; flagstaff on top of main wireless mast, 600 meters, 213° 20'.2; west chimney of metal bungalow, 300 meters, 298° 08'.8.

Egypt

Suez, 1935.--Two stations were occupied. Station A was an exact reoccupation of station A of 1922, about 0.4 mile (0.6 kilometer) east-northeast of the quarantine station, about 186 yards (170 meters), measured at right angles, from the Egyptian State Railway, and just south of the westerly end of the golf course. As the area in which this station was located was to be utilized for industrial development in the very near future, it was not marked. True bearings: mosque in Arbain, 207° 38'.5; mosque in Ibrahim Bey Gilidan, 213° 54'.9; mosque in Abul Eef, 238° 32'.3; mosque in Port Tewfik, 311° 20'.1; cross on Roman Catholic Church at Port Tewfik, 313° 13'.4.

Station C was west of Suez, about 2.5 miles (4 kilometers) along the shore west of the government refinery and near the frontier control gate. It was 164 yards (150 meters) southeast of the guard's hut and 120 yards (110 meters) southeast of the second of a line of holes east of the control gate on south side of road; marked by a stone and cement block 1.4 by 1.4 by 4.9 feet (40 by 40 by 150 centimeters) projecting 16 inches (40 centimeters) aboveground and lettered "Magnetic station, CIW, 1935." True bearings: spire of church, 246° 47'.8; large dome near center of Suez, 249° 12'.7; mast at signal station, Port Tewfik, 271° 45'.3; tip of dome on building in Port Tewfik, 274° 47'.9; tip of lighthouse at sea, 309° 52'.2.

French Equatorial Africa

Bangui, Oubangui-Chari, 1927.--Two stations were occupied. A was close reoccupation of CIW station of 1916, north of town hall, north of Rue du Docteur Gureau, in center of space leveled on point of hill by French government; marked by concrete and brick French survey beacon, tip of pointed top indicating exact point. True bearings: south top edge of lone wireless mast, 72° 09'.7; center front top gable of bungalow, 192° 08'.6; flagpole at military headquarters on first hill to east, 261° 41'.8.

B was about 350 meters south of A, in northeast corner of vacant lot on south side of Rue du Docteur Gureau, in front of town hall and west of travelers' resthouse, 5.0 meters west of edge of concrete and brick open drain on east boundary of lot, and 15.0 meters from southwest brick abutment of drain under Rue du Docteur Gureau. True bearings: southwest corner of treasury building, 56° 06'.9; gable of small magazine with tin roof, 254° 24'.6.

Bol, Tchad, 1927.--Two stations were occupied. A was close reoccupation of CIW station of 1917 and Tilho station of 1908. North of French post, 5.6 meters from north mud wall of post, and 23.3 meters southwest of southwest corner of travelers' resthouse; marked by native earthen pot, buried mouth up, flush with surface of ground. True bearings: northwest corner of travelers' resthouse, 212° 05'.7; tip of native hut in village, 261° 46'.7; northeast corner of mud wall around post, 266° 27'.4.

B was about 150 meters south of A, south of French post, and south of huts of black soldiers, 5.8 meters south of mud wall surrounding huts of black soldiers, and 20.5 meters west of southwest corner of lookout in southeast corner of soldiers' compound. True bearings: southwest corner of mud wall around soldiers' compound,

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91° 46′.6; southeast corner of lookout, 257° 37′.8; tree on island, 349° 21′.6.

Bol, X, Tchad, 1927.--On east bank of Chari River, about midway between Fort Lamy and Bol. True bearing: tip of dead tree, 213° 37′.5.

Fort Archambault, Oubangui-Chari, 1927.--Two stations were occupied. A was close reoccupation of CIW station of 1917, on west bank of Chari River, in "La Place," 18.7 meters east of northeast corner of monument and in line with its north foundation face, and 77.6 meters west of grand stairway leading down to river; marked by tent peg driven flush with ground. True bearings: southeast corner of post and telegraph building, 31° 44′.7; southwest corner of wall of government stores, 165° 50′.8; northwest corner of office, 359° 03′.4.

B was about 400 meters west of A, in vacant plot west of governor's resthouse, north of native market and north of street to river port, 15.0 meters east of hedge along west side of vacant plot, and 7.5 meters south of hedge along north side. True bearings: southeast corner of well house in center of native market, 3° 43′.4; southwest corner of governor's resthouse, 258° 19′.2; corner of brick wall on south side of street to river port, 347° 10′.4.

Fort Crampel, Oubangui-Chari, 1927.--Two stations were occupied. A was close reoccupation of CIW station of 1917, in triangular piece of ground north of administrator's office, west of road from Fort Archambault to Fort Sibut, and directly in front of resthouse for Europeans; 25 meters east of center of road to black soldiers' huts, 23.5 and 24.4 meters, respectively, from the northern and southern of two lime trees just east of this road; marked by tent peg driven flush with surface of ground. True bearings: northeast corner of resthouse for Europeans, 223° 32′.4; northeast corner of administrator's office, 339° 24′.6; tip of soldiers' hut west of office, 353° 32′.2.

B was about 200 meters east of A, east of road from Fort Archambault to Fort Sibut, and east of resthouse for Europeans, 3.0 meters west of small mud hut, and in line with center of this hut and northeast corner of resthouse for Europeans. True bearings: northeast corner of resthouse for Europeans, 75° 45′.6; tip on tall native hut, 129° 26′.0.

Fort Lamy, Tchad, 1927.--Two stations were occupied. A was close reoccupation of CIW station A of 1917 and 1919, and of Tilho station of 1908. Under large Ficus tree known as "Commandant Lamy's tree" and in front of lieutenant colonel's bureau, 6.0 meters south of circular brick wall around Lamy tree, 5.3 meters north of edge of brick water drain parallel to riverbank, and 28.6 meters southwest of west brick pillar of east entrance of lieutenant colonel's bureau; marked by brick pillar 35 by 35 centimeters flush with surface of ground, made of large bricks 18 by 35 centimeters, and lettered "CIW '27," with cross in center indicating exact point. True bearings: peg used for mark and time azimuth observations, 90 meters, 125° 43′.7; southwest corner of lieutenant colonel's bureau, 195° 30′; west brick pillar of east entrance to lieutenant colonel's bureau, 235° 28′.

C was exact reoccupation of CIW station of 1919. In public area known as "La Place," about 0.5 kilometer northeast of A, within walls surrounding native market; 82.3 meters northwest of northwest corner of monument to Commandant Lamy, in line with southeast side of western of two brick market buildings, and 42.25 meters from its nearest corner, 75.5 meters west of south corner of eastern market building, and 3.5 meters from inner face of southwest mud wall of market place; marked by red brick pillar 45 by 45 centimeters and 125 centimeters high, with three grooves for instrument footscrews, and letters "CIW" cut in cement top. True bearings: west end of roof of lieutenant colonel's bureau, 0.4 kilometer, 8° 16′.5; east gable end of treasury building, 79° 26′.7; bottom of right leg of wireless tower, 123° 58′.5; northmost wireless mast, 154° 38′.3; bottom of nearest corner of western market building, 218° 44′.9; bottom of south corner of eastern market building, 271° 38′.0; top of monument to Commandant Lamy, 334° 10′.4.

Fort Sibut, Oubangui-Chari, 1927.--About 10 meters north of CIW station of 1917, in northeast corner of flower garden, directly in front of house of chief of subdivision, 2.0 meters north of rocks around circular flower bed, and 10.8 meters north of young palm tree in center of this flower bed, the palm being 74.0 meters east of north brick post of steps to house of chief of subdivision; marked by tent peg driven flush with surface of ground. True bearings: south brick post of steps to house of chief of subdivision, 76° 03′.9; flagpole in center of garden, 356° 45′.0.

Kabo, Oubangui-Chari, 1927.--West of road from Fort Archambault, just north of where it branched off to Batangafo from old road to Fort Crampel, on opposite side of road from resthouse for Europeans, in line with south side of house, and 13.5 meters from center of road. True bearings: tip of native hut west of road to Fort Archambault, 180° 30′.3; northwest corner of former resthouse for Europeans, 202° 48′.1.

Miltou, Tchad, 1927.--About 50 meters northeast of CIW station of 1917, in compound of post and telegraph, exactly in line with center of road entering compound, 14.5 meters from large cottonwood tree on north side of road entrance, 15.4 meters from tree on south side of entrance, 6.8 and 7.0 meters west and south, respectively, of two small guava trees; marked by tent peg with top flush with surface of ground. True bearings: tip of native hut, 39° 13′.4; southwest corner of magazine, 157° 46′.3; southwest corner of post and telegraph office, 319° 16′.5.

Kenya

Equator, Rift Valley, 1933.--On the Nakuru-Eldoret road via Kampi-ya-Moto, 1.9 miles (3.1 kilometers) on the Eldoret side of the turn to Equator railway station, and about 0.50 mile (0.8 kilometer) on the Nakuru side of the turn to Canada Farm; about 100 yards (91 meters) west of a hut used by Dr. Hins for azimuth observations in 1931, 1 yard (1 meter) from east side of road, and 63 yards (58 meters) south of the turn leading to the hut; station not marked. True bearing: tree about 5 miles (8 kilometers) distant, 82° 10′.8.

Fort Hall, Kikuyu, 1933.--About 80 yards (73 meters) south-southwest of the Fort Hall police station, on the same hill as the administrative offices, and on the edge of the golf course; 1 yard (1 meter) southwest of the footpath passing west of police station. From the flagstaff in front of police station the magnetic station bears

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Kenya--concluded

S 19° W; station not marked. True bearing: plumb-bob hung on tree, 289° 36'.7.

Gilgil, Naivasha, 1933.--On the Nairobi-Nakuru road about 6 miles (10 kilometers) on the Nakuru side of Gilgil, 10 yards (9 meters) south of the road at a point 340 paces (310 meters) on the Nakuru side of bridge across stream flowing into Lake Elmentita, in a small clearing on thick brush-covered land; station not marked. True bearing: temporary post, 147° 37'.2.

Kampi-ya-Moto, Rift Valley, 1933.--Between the Kampi-ya-Moto station of the Kenya-Uganda railway and the main Nakru-Eldama Ravine road, 30 yards (27 meters) south of the road, about 80 yards (73 meters) from the northwest corner of the station goods shed, and 2 yards (2 meters) west of the most westerly footpath from the road to the railway station; station not marked. True bearing: bisection near ground of a post bearing a notice, 231° 34'.3.

Kijabe, Kikuyu, 1933.--On the Nairobi-Nakuru road about 67 miles (108 kilometers) from Nakuru on the Nakuru side of the east escarpment of the rift valley, 5.5 yards (5 meters) northeast of the road measured from a point 20 yards (18 meters) on the Nairobi side of the road sign "Nakuru 67 M;" station not marked. True bearing: temporary azimuth post, 119° 06'.0.

Kisumu, Nyanza, 1933.--Two stations were occupied. Station A was practical reoccupation of CIW station of 1921, about 0.25 mile (0.4 kilometer) east of the railway station on plot of open ground between the Indian shops and the buildings immediately southeast of the railway, 50 yards (46 meters) north of road passing along south boundary of open space; station not marked. True bearing: southwest end of ridge of the station warehouse roof, 73° 38'.4.

Station B was about 1 mile (1.6 kilometer) north-northeast of A and about the same distance north of the town, on the north side of the gulf between the lake and the short road joining the aerodrome to the main Kisumu-Mumias road, about 0.25 mile (0.4 kilometer) southeast of aerodrome, and about 200 yards (180 meters) north of the lake shore; 66 yards (60 meters) south of the road to the aerodrome, and 12 yards (11 meters) southeast of large ant hill, a few yards west-northwest of which was a lone thorn tree; station was not marked. True bearings: temporary azimuth post, 53° 07'.1; railway telegraph pole near bridge, 300 yards (274 meters) distant, 194° 11'.2; highest point on mountain range about 7 miles (11 kilometers) east, 242° 57'.6; east minaret of Kisumu Mosque, 1 mile (1.6 kilometer) southeast, 331° 57'.0.

Mombasa, 1934.--Exact reoccupation of CIW station of 1921, at English Point, reached by taking the road south from east end of pontoon bridge which crossed the channel east of Mombasa, 9 paces north of point in path 250 paces northeast of English Point; marked by concrete block 12 inches (30 centimeters) square, standing 2 feet (0.6 meter) above surface, its top face lettered "CIW 1921." True bearings: top of east corner of wall of old fort, 0.50 mile (0.8 kilometer), 16° 17'.5; sharp dome (Vasco da Gama monument), 0.50 mile (0.8 kilometer), 28° 09'.0; ornamental spike at south end of roof of house, 0.50 mile (0.8 kilometer), 64° 01'.8; ornamental urn on southeast corner of the high school, 133° 09'.7.

Nairobi, 1931, 1934.--Two stations were occupied. A, the permanent hut for magnetic observations erected by Dr. A. Walter, Director of the British East Africa Meteorological Service, was located about 1 mile (1.5 kilometer) north and 4 miles (6.5 kilometers) west of the Nairobi General Post Office, on mission property about 1 mile (1.6 kilometer) west-southwest of the Roman Catholic Mission's Chapel of St. Austin and the Loreto Convent, roughly 0.25 mile (0.4 kilometer) east of the boundary of the Kiampu Native Reserve, and 0.12 mile (0.2 kilometer) south of the Nairobi River. The hut was of brick, having a sliding roof for solar work and provided with windows and ventilators. The easterly of the two pillars was used for magnetic work. True bearings: top insulator of right-hand telegraph pole, 92° 06'.8; edge of house, under eaves, side next to shed with sloping roof, 170° 56'.6; gable of Mission church, 1 mile (1.6 kilometer), 248° 12'.4; left edge of native hut just below eaves, 255° 10'.3; right edge of tree about 200 feet (61 meters), base at grass line, 267° 55'.

Station B was 3.7 miles (5.9 kilometers) east and 1.2 miles (1.9 kilometer) south from the mission station and was an exact reoccupation of station B of 1921. The large concrete pillar erected on the site by the Land Survey Department after the 1921 observations were made was removed before the 1934 observations were begun. It was approximately 1300 feet (396 meters) nearly due southwest of the General Post Office, about 1000 feet (305 meters), measured at right angles, from the main railway line along Jackson Road, about 1500 feet (457 meters), measured at right angles, from Whitehouse Road, about 1000 feet (305 meters) nearly due east of the new English cathedral, and 37 paces southwest of a concrete water-drainage channel. The station was marked at the time by a peg but arrangements were made for later installation of a suitable concrete marker by the Meteorological Service. True bearings: left edge of main part of new cathedral, 92° 12'.0; ball on dome of Native Registration Office, about 1500 feet (457 meters), 205° 47'.9; top of spire of Roman Catholic Church, 1200 feet (366 meters), 244° 33'.9; left edge of gable window, 0.25 mile (0.4 kilometer), 259° 54'.8; left edge of base of iron pole, 54 paces, 350° 58'.6.

Naivasha, Naivasha, 1933.--Approximately east of the south end of a crescent-shaped island in Lake Naivasha, reached by going about 2 miles (3 kilometers) from Naivasha toward Nairobi to a fork in the road, thence 2.8 miles (4.5 kilometers) along the lake road which was the southwest branch; 70 yards (64 meters) northwest of the road around the lake and 30 yards (27 meters) southwest of the track leading down to the lake, on a narrow strip of government owned land between two privately owned plots; station not marked. True bearing: temporary azimuth post, 296° 29'.8.

Nakuru, 1933.--Probably a proximate reoccupation of CIW station of 1921. (No description or sketch supplied.) True bearing: first electric light pole, 259° 10'.3.

Nanyuki, Kikuyu, 1933.--About 0.50 mile (0.8 kilometer) north of the town on grounds of the "Sportsman's Arms" hotel, on a section of rough grass land between the road and the driveway leading to the hotel, on the bisector of the angle between the driveway and the road, and at a point where it was about 7 yards (6.5 meters) from each; not marked. True bearing: south corner of southeast wing of hotel, 150° 13'.5.

AFRICA

Nigeria

Dambam, Kano, 1927.--South of native village and south of road from Kano to Maidugari, 10.5 meters due west of midpoint of west mud wall around European resthouse compound, and 23.6 meters in same line west of large lone tree in compound. True bearing: tip of servant's hut in resthouse compound, 274° 30'.2.

Dikoa, Bornu, 1927.--Close reoccupation of CIW station of 1919, near middle of large square, west of former German post now used as headquarters of government district office; 70.5 meters west of and in line with north side of gate entrance to post, and 98.0 meters northwest of south corner of wall around post. True bearings: flagpole on gate entrance to post, 245° 41'.1; tip on native hut, in compound south of post, 290° 30'.3.

Maidugari, Bornu, 1927.--Two stations were occupied. A was about 0.50 mile (0.8 kilometer) north of road from Kano to Maidugari, near the trading firm's compound, on sandy hill directly in front of Niger Company's canteen, and about halfway between this canteen and government brickkilns, 89.5 meters south of center of front of Niger Company's canteen, 29.1 meters southwest of large tree, and 18.35 meters due west of small tree; marked by red brick pillar 45 by 45 centimeters, standing 45 centimeters high, lettered "CIW 1926," with cross in center of concrete top indicating exact point. True bearings: northeast corner at base of Niger Company's bungalow, 157° 27'.7; northeast corner of brickkilns, 275° 52'.6.

B was about 400 yards (366 meters) northwest of A, northwest of Niger Company's compound, and 14.0 meters south of center of road leading to new government resthouse, in line with east face of mud wall of old house and 28.8 meters south of it, and 21.5 meters northwest of lone tree. True bearings: northeast corner of government resthouse, 93° 42'.9; southwest corner of mud wall around Niger Company's compound, 303° 44'.4.

Northern Rhodesia

Abercorn, 1930.--On vacant land opposite the District Commissioner's residence, the location having been selected as a site for a station of the British East African Meteorological Service: marked by a brick pier. True bearings: ruled mark on resthouse, 103° 43'.2; corner of the doctor's bungalow, 162° 04'.0.

Livingstone, 1935.--Three stations were occupied. Station A was probably an exact reoccupation of CIW station of 1920 although the original marker could not be found. On open park land about 150 meters north of the middle point of the north boundary line of the power-station reserve, about midway between stile in east fence of railway reserve and the west corner of golf course, in line with southeast fence around bungalows and 96 meters from south corner of this fence, 95 meters east of iron plate at south side of stile in east fence of railway reserve, and 11 meters north of most westerly of three trees in line; not marked. True bearings: letter "F" in "Beware of trains" sign, 27° 24'.5; south side of present stile (hole in fence), 106° 18'; old iron post at south side of possible stile, 107° 00'.3; nearby power pole, north, 178° 45'.6; nearby power pole, south, 209° 47'.7.

Station A (secondary) was established to test the effects of two large iron power poles erected since the 1920 occupation and distant 25 and 28 meters from A. This test point was 35.5 meters from A, in azimuth 306° 19'. Azimuth, declination, and inclination observations were made here.

Station B, a better location for secular-variation purposes, was on the airfield about 3 kilometers south of Livingstone, 427 meters south-southeast of north corner of airfield (designated CL 153 on plan of Livingstone aerodrome), 76 meters west of L.M. pipe line, and 27.5 meters north of road; marked by a large cement block, nearly flush with ground, and lettered "Magnetic Sta. CIW 1915," this block to be covered later with a removable mound of stones cemented into a single mass and labeled with a survey mark, this mound to be taken away for the observation period. Station marked by courtesy of the Survey Department. True bearings: left edge of left of three stacks at Gambesi Sawmills, 222° 44'.9; right edge of right of same three stacks, 223° 09'.5; left edge of left hangar (nearest corner), 301° 12'.4; center of power pole behind hangar, 301° 18'.3; wind pole, at center of base, 305° 31'.9; left edge of left aviation landing mark, 339° 20'.9.

Portuguese East Africa

Beira, 1930, 1934.--Four stations were occupied. Station B was a close reoccupation of station B of 1920, about 0.8 kilometer north of cathedral, on grounds of Lisboa e Beira Sports Club, about 1 kilometer east of the center of town, east of intersection of Avenida Marques de Fontes and Avenida Pinto Basto, and west of aviation field, in line with the northwest and southwest football goal posts, 13.45 meters and 15.4 meters from the northwest and southwest posts, respectively. This station was not marked. True bearings: cross on cathedral steeple, 15° 04'.6; southwest end of roof of club pavilion, 72° 36'.9; northeast end of same, 84° 28'.5; southeast gable of club lavatories, 127° 19'.4; northeast edge of higher of two railroad water tanks, 163° 28'.4; wind vane on observatory, 346° 49'.1; spire of church at convent, 356° 11'.8.

Station C was about 2 kilometers north of the cathedral, about 0.5 kilometer north of Cemeterio de Santa Isabel, near small bridge on Estrada Sousa Araujo, 30 meters outside of city limits, 2 meters north of line adjoining northwest and northeast pillars of bridge, and a-about 70 meters east of the northeast pillar; marked by wooden peg. True bearings: wind vane on observatory, 2° 51'.4; spire of church at convent, 7° 21'.7; cross on cathedral steeple, 16° 03'.7; flagstaff on port office, 69° 22'.9; apex of southeast pillar of small bridge, 110° 04'.4; apex of northeast pillar of same, 111° 56'.5; west finial of red house among palm trees, 351° 38'.7.

Station D was 81 meters almost due south of B, 4.0 meters from the southeast sideline of the football field at its center, 64 meters from each of the nearer two goal posts to the north and west, and roughly 100 meters from the southeast boundary of the grounds, marked by a cement block 30 centimeters square, the exact spot being indicated by a hole 5 centimeters in diameter and 5 centimeters deep in the upper surface, block set with upper surface 25 centimeters below surface of ground.

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Portuguese East Africa--continued

True bearings: cross on cathedral, 0.7 kilometer, 16° 40'.1; left end of pavilion roof, (Ciné Olympia) 115° 49'.1; center gable of pavilion, 100 meters, 122° 52'.5; right edge of higher of two water tanks, 1.5 kilometer, 169° 52'.4; station B, 81 meters, 179° 29'.5; gable at west end of house next to airfield, 275° 51'.8; right edge of water tank, 0.5 kilometer, 339° 47'.2.

Station E was about 240 meters east-southeast of C in an undisturbed area of grass land, 2.1 kilometers north-northeast of the railway station, an equal distance in the same general direction from "Sport Lisboa e Beira" and 0.7 kilometer northeast of the Cemeterio Santa Isabel, exactly in line with a row of iron posts beginning 15 meters beyond the northeast pillar of a bridge and extending east-southeast exactly at right angles to Estrada Sousa Araujo, 302 meters from the first post near the road and 120 meters beyond the last post of the line; marked by a cement block 30 centimeters square and projecting 10 centimeters above the surface. True bearings: finial on house among palm trees, 10° 11'.5; cross on cathedral, 22° 33'.4; line of posts at right angles to Estrada Sousa Araujo, 112° 40'.2; gable at south end of house, 236° 58'.0; gable at west end of northern of four long sheds beyond studded concrete wall, 330° 12'.9.

Boane, Lourenço Marques, 1930.-- Close reoccupation of Chaves' station of 1906 and exact reoccupation of Metzner's station of 1907 which was also occupied by da Fonseca and Vaz in 1924; 31 kilometers southwest of Lourenço Marques, on the hill of Boanine, about 0.50 kilometer southwest of the railway station at Boane. The observing pillar was in a roofless nonmagnetic hut about 40 meters north of a large water tank supplying the railway station. True bearings: azimuth beacon near north end of a wooded hill range about 7 kilometers distant, 84° 41'.3; nearest corner of veranda of house, southward, 351° 21'.9.

Lourenço Marques, 1930.--Exact reoccupation of pier used by da Fonseca and Vaz in 1924, in grounds of Observatorio Campos Rodrigues, about 30 meters north of the transit telescope. True bearing: left-hand end of top of roof of hospital, 87° 24'.6.

Lourenço Marques, 1934.--Four stations were occupied. Station A was an exact reoccupation of station of 1930, on grounds of the Observatorio Campos Rodrigues, about 3 kilometers east of the railway station, and 0.50 kilometer southeast of the Polana Hotel. Observations were over the pier erected by the observatory authorities for magnetic observations, 27 meters due north of the transit telescope. True bearing: left end, top, of roof of hospital building, 0.25 mile (0.4 kilometer), 87° 24'.6.

As somewhat disturbed conditions were found at this station, a new station with auxiliary and secondary stations was established.

Station B was 3 kilometers east-northeast of the railway station, 0.8 kilometer north of the Observatorio Campos Rodrigues, and 1.0 kilometer northwest of the Polana Hotel, in a strip of government land just south of the airfield and east of the civil prison, 100 meters perpendicularly northwest of the line of the northwest prison wall, and the same distance perpendicularly northeast of the near edge of the road running parallel to the southwest prison wall. The paced distance from the station to the airfield fence was 61 meters. True bearings: spike on water tank, 1.4 kilometer, 59° 38'.8; left edge of house, 300 meters, 108° 19'.7; left edge of beacon on a mound, 730 meters (scaled), 178° 01'.5; left edge of prison wall, 240 meters (scaled), 236° 08'.0; right edge of prison wall, 210 meters (scaled), 282° 10'.5.

Station C was in a strip of land just north of the prison and between the airfield and the golf course, the land, in 1934, being the property of the Delagoa Bay Lands Syndicate, exactly 100 meters from station D which was in the same strip of land, in the direct line from C to the primary mark, station D being exactly 100 meters, measured at right angles from the northeast prison wall. True bearings: wind vane at Observatorio Campos Rodrigues, scaled distance 1120 meters, 7° 35'.8; left edge of prison wall, 210 meters, 7° 42'.1; right edge of prison wall, 190 meters, 36° 10'.4; spike on water tank just north of Avenida Pinheiro Chagas, 1.5 kilometer, 56° 12'.5; left edge of house near aerodrome, 600 meters, 73° 35'.8; left edge of beacon mound, scaled distance 540 meters, 141° 18'.3.

Station D was exactly 100 meters from C, in the same strip of land lying just north of the prison between the airfield and the golf course, and directly in line from station C to the wind vane, at the Observatorio Campos Rodrigues, exactly 100 meters perpendicularly northeast from the northeast prison wall. True bearings: wind vane at Observatorio Campos Rodrigues, scaled distance 1020 meters, 7° 36'.3; left edge of prison wall, 7° 48'.9; right edge of prison wall, 60° 52'.6; left edge of house near aerodrome, scaled distance 550 meters, 83° 04'.0; left edge of beacon on mound, 148° 02'.7; left edge of iron pole, 220° 04'.7.

Cement markers 25 by 25 by 100 centimeters for each of these three stations B, C, and D, had been made up and were left in charge of Dr. Soares, Director of the Observatorio Campos Rodrigues, to be put in place when permission had been obtained from the owner of the land to so mark stations C and D.

Matola, Lourenço Marques, 1930.-- Close reoccupation of station occupied by da Fonseca and Vaz in 1924. From near the 9 kilometer mark on the main road from Lourenço Marques to Boane, a road leads south 1 kilometer to a cement factory. The magnetic station was about 800 meters east of the cement factory, 250 meters north-northeast of an ice factory, in a large vegetable garden belonging to the house of the stationmaster, in line with the southwest edge of the rear extension of this house, 7 meters northeast of a hedge, 15 meters southeast and 24 meters west, respectively, from two telegraph poles, 1.8 meters southeast and 1.5 meters southwest, respectively, from two small mandioca trees; no mark installed for reason of cultivation. True bearings: left edge of north chimney on ice factory, 24° 21'.8; left edge of south chimney of ice factory, 30° 53'.6; lightning conductor on south chimney of cement factory, 100° 25'.0; apex of pyramidal tower on house, 276° 06'.1; finial of two-story house, 287° 30'.0.

Mozambique, 1934.--Six stations were occupied. Station B was an exact reoccupation of CIW station B of 1920, on sports field south of the southwest corner of Fort São Sebastien at the northern end of the island, on land formerly occupied as a rifle range; 89 meters south-southeast of the southwest corner of the fort, 29 meters east of a cement marker in the center of the field, 21.1 meters southwest of the nearest goal post and 29 meters

Portuguese East Africa--concluded

from a cement marker at the southeasterly corner of the field; not marked. The perpendicular distance to the northeast goal line was 20.0 meters and to the southeast sideline, 23.0 meters. True bearings: center of church on beach, 2 kilometers, 37° 33′.7; left edge of garden wall at end of field, 100 meters, 51° 10′.3; left edge of wall at top, southwest corner of fort, 166° 34′.6; tip of small tower at southwest corner of fort, 90 meters, 168° 07′.6; right edge of near wall of southwest section of fort, 207° 03′.5; south corner of fort at top of wall, 200 meters, 251° 51′.7; tip of lighthouse, 5 kilometers, 298° 01′.3.

Auxiliary station C was about 100 meters southwest of B, the observations having been made directly over a drill hole in the cement marker at the southwesterly corner of the sports field; about 16 meters from the southeast edge of low garden wall, 22.8 meters from sea wall along projected line of goal posts, 32.9 meters from the nearer goal post, about 170 meters from the house on the west side of Campo Gabriel, about 152 meters from the southwest corner of the fort, and 112 meters from the marker at the southeasterly corner of the field. True bearings: center of church on beach, 2 kilometers, 36° 32′; tip of small tower on southwest corner of fort, 200° 39′.3; right edge of near wall of southwest wing of fort at top of wall, 218° 06′.8; top of wall at south corner, 244° 54′.7; tip of lighthouse, 5 kilometers, 297° 06′.6.

Secondary station A was 88 meters from C along the southerly boundary of the sports field and 2 meters outside or south from this boundary; not marked. True bearings: left edge of low garden wall at westerly end of field, 63° 56′.9; tip of small tower at southwest corner of fort, 167° 52′.9; left edge of fort wall at top, southwest wing, 166° 40′.9; right edge of southwest wing, 199° 51′.6; south edge of fort wall at top, 244° 19′.6; tip of lighthouse, 5 kilometers, 297° 49′.0.

Secondary B was 9.14 meters northwest of auxiliary station C and directly in line from this station to the lighthouse; not marked. True bearing: tip of lighthouse, 297° 06′.6.

Secondary C was 23 meters from auxiliary station C and directly in azimuth line from the latter to lighthouse mark; identical azimuth; station not marked.

Secondary D was 10 meters from the cement marker in the center of the sports field on a line parallel with the side lines and in a general direction away from the fort; not marked; no bearings taken.

Pessene, Lourenço Marques, 1930-1934.--Three stations were occupied. Station A was a close reoccupation of Beattie's station of 1903 and Chaves' of 1906, about 20 meters west of the former location, about 200 meters east of the railroad station, and 172 meters northeast of the track measured at right angles from a point 111 meters from the end of the station platform, 35 meters from the southeast corner of a fence surrounding a house to the southward, 6 meters toward the southeast of a slight ridge, marked by a tent peg covered by a pile of stones. True bearings: left edge of small sheet iron hut 100 meters distant, 42° 54′.1; right edge of same hut, 43° 38′.1; telegraph pole along railroad, 56° 33′.5; northwest end of ridge of house roof 40 meters distant, 75° 43′.4; east finial on roof of railroad station, 88° 51′.6.

Station B (1934) was 56 meters almost due north of station A, about 200 meters east-northeast of the railroad station, about 75 meters north of a cement boundary marker which stands at the easterly corner of a fenced enclosure around a house, 7 meters south of a small double tree, 1.5 meters south of a path and near the junction of two branches thereof, marked by a cement block 25 by 25 by 100 centimeters set so that it projects 15 centimeters aboveground, a cross on the upper surface marking the exact spot. On one face of the block was inscribed "CIW 1934" and on the opposite face was inscribed "OCR." True bearings: left edge of iron pole visible above iron toilet building, 0.25 mile (400 meters), 2° 41′.1; left edge of next pole away from Lourenço Marques, 17° 25′.3; left end top of roof of house, 80 meters, 34° 36′.8; right end of roof of same house, 38° 40′.8; right end top of roof of railway building, 69° 55′.3; auxiliary station C, 249° 55′.3.

Station C was 47 meters east-northeast of station B in azimuth line extended through station B from right end top of railway building roof; marked by an exact duplicate of the marker installed at station B. True bearing: right end top of roof of railway building, 69° 55′.3.

Southern Rhodesia

Bulawayo, 1935.--Four stations were occupied, A, C, D, and E. Station A was at the Bulawayo Meteorological Observatory, Lawley Road, in an old nonmagnetic hut formerly used by Father Goetz. The north pier only was used. True bearing: the midpoint between two prominent dark spots on an electric insulator set in cement on the azimuth pier erected by Father Goetz, 36° 50′.2. Due to the removal of an astronomical building which formerly stood about 75 feet (25 meters) from the hut, it was not considered that the 1935 and 1930 magnetic values could be safely compared for secular-variation purposes. For future secular-variation work no reliance can be placed on the hut for the reason that it is expected that the entire Meteorological Station will soon be shifted to a site closer to the airfield. Under these circumstances, the hut was used only as a convenient place in which to take diurnal-variation observations.

Station C was in the middle of a strip of park just east of the Meteorological Observatory, about 4 kilometers east or northeast of railroad station, in center of proposed city park block bounded at present by 7th Street on the south, Townsend Road on the west, probably later by 8th Street on the north, and George Avenue on the east, exactly in line with property line fence parallel with 7th and 8th Streets and midway between them, exactly 500 feet (152.4 meters) from the fence on the west side of Townsend Road (measured to the northeast corner of the Observatory property); marked by a cement block 12 by 12 by 48 inches (30 by 30 by 120 centimeters), and lettered "CIW 1935" on top, a hole indicating the exact point. True bearings: left edge of house chimney, 0.50 mile (800 meters), 7° 54′.8; tree, 30 meters, 20° 54′; right edge of left gatepost, 600 feet (180 meters), 64° 05′.3; nonmagnetic hut, left end of roof, 560 feet (170 meters), 90° 00′.3; line of poles along north end of observatory fence, 105° 04′; left edge of house, 600 feet (180 meters), 111° 11′.2; tree, 9 meters, 130° 04′; left edge of house chimney, 165° 59′.3; tree, 31 meters, 274° 24′; left edge of house, part to left of window, 334° 04′.0.

Station D was about 1 mile (1.5 kilometers) south of

Southern Rhodesia--continued

the Meteorological Observatory and station C, in the area enclosed by the race track of the Turf Club, exactly in line with the perpendicular to the center of the grandstand at the southeast part of the track, midway between the two inner fences, and 200 paced meters east of the inner fence near the finish line at the grandstand; marked by a block of cement 12 by 12 by 48 inches (30 by 30 by 120 centimeters), lettered "CIW 1935" on top, a hole in the center indicating the exact spot. True bearings: survey beacon, 0.25 mile (400 meters), 38° 23′.4; spike on roof of building to left of main pavilion, 82° 06′.8; right end of top of roof of building with three gables, 157° 48′.0; center of left wireless mast, 218° 18′.8; left edge of large lone building (maternity home), below eaves, 245° 26′.7; left edge of prominent house on horizon, 1.5 mile (2.5 kilometers), 340° 20′.8.

Station E was about 1.5 mile (2.5 kilometers) north-northeast of the Meteorological Observatory nonmagnetic hut and station C, on the grounds of the municipal sewage-plant, about 200 meters northeast of the disposal works in a fenced enclosure around an area unsuited for cultivation due to the composition of the soil, 143 meters nearly due east of the fence corner which was about 200 meters northeast of the center of the disposal plant; marked by a cement post 30 by 30 by 120 centimeters, and lettered "CIW 1935," a hole indicating the exact point. True bearings: left edge of brick shelter, 150 meters, 23° 42′.5; lower insulator in front of left iron shed, 200 meters, 59° 20′.5; warning light on left iron shed, 200 meters, 59° 27′.6; left edge of top of roof of small shed, 200 meters, 74° 42′.6; corner fence post, 143 meters, 97° 06′; small isolated sharp hill, 238° 41′.8.

Hartley, Nashonaland, 1930.--Two stations were occupied. Station A was close reoccupation of Beattie's station of 1903, about 400 meters east of railroad station, 27 meters from line of trees on north side of road to village at point 390 meters from railroad booking office, 28 meters southeast of fence along southeast boundary of railway reserve, and 8 meters southwest of extended line of fence along northeast boundary of reserve; marked by small concrete block set in ground and lettered "U.C.T. 1930" with cross in center to indicate exact spot. True bearings: iron chimney, 240° 14′; right edge of white pillar of house, 1 kilometer, 320° 42′.2; magnetic station B, 321° 03′.5.

Station B was about 800 meters east-southeast of railroad station, about 600 meters southeast of station A, 4.5 meters southeast of path on common, in line with northeast side of first house on right of road to Concession Hill, and about 110 and 119 meters from the rows of trees bounding road on northwest side of the house; marked by small concrete block set in ground and lettered "U.C.T. 1930" with cross in center to indicate exact spot. True bearings: magnetic station A, 141° 03′.5; west finial of house, 284° 44′.8; left edge of next house, 318° 37′.8; right edge of shed, 331° 11′.5.

Salisbury, 1930, 1935.-- Four stations were occupied. Station A was about 1 kilometer north of Beattie's station of 1903, about 35 meters true north of Cecil Square adjoining Miekle's Hotel; marked by concrete block 25 by 25 centimeters at top and lettered "U.C.T. 1930 Magnetic Sta. Not to be moved." True bearings: right edge of concrete gate post, 1° 07′.9; left edge of pillar facing previous mark, 1° 40′.6; nearest corner of building diagonally northeast of Cecil Square, 215° 13′.4; east edge of most easterly pillar visible on Meikle's Hotel, 345° 18′.8.

Station B was about 3 kilometers northeast of Meikle's Hotel, in grounds of St. George's College School for Boys, 37 meters south of fence along south boundary of Alexandra Park, and 20 meters west of extended line of fence between park and football field; not marked. True bearings: northeast gable of house, 400 meters, 16° 24′.4; ventilator near right end of large sheds, 27° 51′.0; left edge of iron corner post at northwest corner of field, 130° 42′.0.

Station C was a practical reoccupation of Beattie's station of 1903, about 400 meters southeast of railroad station, about 300 meters south of main line of railroad, opposite old cold storage building on ridge about 20 meters north of small stream, and roughly 75 meters west of a road; marked by a pile of stones. True bearings: left edge of block chimney, 19° 24′.8; flagstaff on Salisbury Kopje, 177° 59′.1; spike on dome of Meikle's Hotel, 164° 26′.9; left edge of base of electric power standard north of stream, 260° 04′.1; east edge of first electric power standard south of stream, 307° 18′.1.

Station D was at center of compass station at Salisbury Air Field, about 100 meters southeast of the main hangar; marked by a large cement block nearly flush with the ground and lettered "CIW X March 1935," (marked through courtesy of Town Engineer and Air Field officials). True bearings: left edge of distant house, 2.5 kilometers, 40° 31′.6; right edge of house, 400 meters, 217° 01′.4; survey beacon on hill, 1.5 kilometer, 284° 51′.1; right edge of house on hill near beacon, 288° 34′.4; left edge of powerhouse stack, 308° 14′.4; projection on center of hut roof, 800 meters, 352° 46′.7.

Umtali, Nashonaland, 1930.-- Proximate reoccupation of Beattie's station of 1903, in field between park and athletic grounds, 65 meters northeast of middle of path at point 180 meters southeast of masonry part of footbridge on path, and 8 meters northwest of a well-defined footpath running northeastward; marked by cement block slightly below ground level and lettered "U.C.T. 1930" with peg in center to indicate exact spot. A similar cement block, marking the north end of a meridian line 135 meters long, is 14 meters southeast of the nearer row of trees along path, 4 meters southwest of a row of four trees (two small and two large), and 165 meters northwest of path leading from park. True bearings: fence post to left of right-hand goal posts, 100 meters, 13° 23′.1; west edge of large black chimney, 179° 27′.1; telegraph pole, 300 meters, 256° 02′.1; north edge of upright part of stone cross on hill, 264° 09′.0; east edge of brick house, 333° 15′.0.

Victoria Falls, 1930, 1935.-- Four stations were occupied. Station A, 1930, was a close reoccupation of CIW station of 1920, in Victoria Falls Park, about midway between hotel and Devil's Cataract, about 45 meters southeast of path from hotel to cataract measured from a point on the path about 102 meters southwest of intersection of path and railway, and 45 meters southwest of small bridge; marked by irregular pointed stone about 15 by 25 centimeters set with point 25 centimeters above ground and covered with pile of small stones. True bearings: left-hand of two railroad survey beacons, 156° 43′.8; right-hand beacon (center of rail at bottom), 159° 04′.6;

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telegraph pole, 169° 33′.2; plate marked "20" on railroad, 171° 19′.3; post of notice board on bridge trolley line, 206° 42′.0. Practical reoccupation of this station was made in 1935, the exact location being rendered unsuitable by the accumulation of a large rubbish heap.

Station A, 1935, was 39 meters almost due north of A, 1930, bearing S 178° 30′ W, and 10 meters south of the south edge of an old path; not marked. True bearings: "T" in "NOTICE" on sign, 60 meters, 164° 35′; left edge of trolley shed, 43 paces, 204° 42′; projection on pole, left side at base, 90 meters, 226° 57′.0.

Stations A, B, and C of 1935 were at intervals of 120° on the arc of a circle of radius 39 meters with the 1930 station as its center.

Station B was southwest of the 1930 station and in line between A and D; not marked. True bearings: station D, 38 meters, 26° 10′.0; station A, 206° 21′.7; station C, 265° 08′.2.

Station C was southeast of the 1930 station and almost due east of B; not marked. True bearings: 1930 station, 115° 43′.8; right edge of trolley shelter, 90 meters, 168° 50′.0.

Station D, established to provide a reliable secular-variation station, was 79 meters southwest of the 1930 station, 38 meters south-southwest of B, in line with A and B and 45 meters southeast of path leading from hotel to the falls; marked by large block of cement almost flush with ground surface, a piece of rock projecting from top surface of block indicating exact spot. A large mound of stones was built around this which should be removed during future observations as the stones are basaltic with possible magnetic effects. Permission to observe may be obtained from the "Curator of the Falls." True bearings: left edge of signpost, 188° 01′.0; right edge of lower trolley shed, 205° 50′; station of 1930, 221° 00′.6.

South-West Africa

Aus, Luderitz, 1929.--Two stations were occupied. Station A was exact reoccupation of CIW station of 1916, about 620 meters south of railroad station, 220 meters south of line of north face of railroad pumper's cottage, and 12 meters east of middle of Kubub Road; marked by somewhat pointed white quartz stone 20 by 9 centimeters set in ground and covered with small heap of stones. True bearings: vertical rock face on skyline, 43° 36′.3; spike on west gable of railroad pumper's cottage, 114° 44′.3; finial over east end of police station, 168° 37′.4; stone beacon on skyline, 337° 36′.3.

Station B was 190 meters south of A, 20 meters north of a stream bed, and 38 meters west of middle of Kubub Road; marked by white quartz stone set in ground and covered with cairn. True bearings: vertical rock face on skyline, 58° 50′.1; spike on west gable of railroad pumper's cottage, 139° 08′.4; finial on east gable of police station, 169° 06′.1; magnetic station A, 171° 31′.0; stone beacon on skyline, 336° 17′.5.

Gibeon, Gibeon, 1929.--Close reoccupation of CIW station of 1916, about 400 meters north of open space in middle of village, 50 meters south of middle summit of hill with three summits, southwest of central part of native location, about 250 meters east-southeast of large stone beacon on western summit, about 50 meters east of road running north from village; marked by tent peg covered with cairn. True bearings: brick pillar in center of west face of Public Building, 4° 32′.4; finial at west end of Public Building, 4° 28′.2; beacon on skyline, 10° 45′.4; base of flagstaff in front of police barracks, 19° 09′.9; German Church spire, 36° 40′.6; beacon on west summit of hill, 91° 16′.9; southernmost steel telegraph pole above skyline, 311° 24′.7.

Kalkfeld, Otjiwarongo, 1928, 1929.--Three stations were occupied. Station A was a practical reoccupation of CIW station of 1909, about 120 meters southeast of the 1909 station, about 300 meters east of railroad station, 95 meters from southeast corner of Kohlbitzer's store and in line with east side of store, and in line with north side of south building of hotel; marked by knob at north end of stone 30 by 20 centimeters set in ground. True bearings: south gable of hotel, 103° 08′.0; north edge of south building of hotel, 107° 45′.7; east edge of Kohlbitzer's store, 196° 53′.6; east edge of house with flat roof, about 200 meters, 325° 00′.8.

Station B was about 100 meters southwest of south side of hotel annex, about 200 meters west of water tank south of railroad station, about 4 meters east of group of three trees; marked by concrete block 30 by 30 centimeters inscribed "U.C.T. 1929" with cross in center to indicate exact spot. True bearings: south gable of hotel annex, 232° 46′.9; north side of water tank, 283° 50′.2; southwest corner of iron shed, 315° 06′.1.

Station C, a secondary station, was 240 meters southwest of B, in azimuth 41° 43′.1; not marked.

Karibib, Karibib, 1929.--Close reoccupation of CIW station of 1909, south of railroad station, west of municipal buildings, 18 meters north of road running west from municipal buildings, about 20 meters west of small stream, in line with chimney near east end of school and right edge of large distant chimney; marked by large flat stone on which is scratched "U.C.T. 1929," with cross in center to mark exact spot. True bearings: German Church spire, 108° 26′.6; southwest corner of school, 194° 49′.6; beacon on hill, 249° 43′.2; finial at east end of municipal office, 263° 03′.7; northwest corner of municipal office, 263° 38′.0; southwest corner of municipal office, 278° 32′.6; beacon near true south, 359° 59′.6.

Keetmanshoop, Keetmanshoop, 1929.--Practical reoccupation of stations of 1909 and 1916, about 350 meters east of railway station along track, then about 350 meters north (in direction perpendicular to track) to point 19 meters south of line of south boundary of football field, about 70 meters east-southeast of southeast corner of football field, and about 150 meters east of a water tank; marked by a tent peg covered with pile of small stones. True bearings (somewhat uncertain owing to unsatisfactory solar observations): telegraph pole, 350 meters, 3° 23′.4; east finial of large house across railroad, 15° 27′.4; west finial of same, 17° 33′.4; peak of left-hand water tower on hill, 2 kilometers, 20° 22′.2; northeast face of water tank, 150 meters, 104° 15′.4; cleft in summit of east twin peak, 10 kilometers, 345° 24′.2; west twin peak, 345° 43′.1.

Luderitzbucht, Luderitz, 1929.-- On sand plain about 1 kilometer south of railroad station, about 250 meters southwest of sports ground, about 425 meters south of electric power line to Kolmanskuppe, in line with row of telegraph poles along northwest side of sports ground,

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and in line with northeast side of condenser building; marked by wooden peg covered with cairn. True bearings: pointed steeple on Town House, 202° 25′.1; line of telegraph poles, approximately 206° 18′; top of roof visible through frame of electric-power standard, 222° 39′.6; southwest finial of house, 400 meters, 262° 20′.3; telegraph pole on skyline, 264° 26′.8; northeast face of lower (brick) part of railroad condenser house, 332° 34′.9; telegraph pole on skyline, 334° 04′.6.

Mount Brukkaros, Berseba Native Reserve, 1929.--Two stations were occupied. Station A was on south lip of crater, on flat triangular shoulder about 60 meters south of solar observatory cave, about 12 meters from south side of triangular piece of land, about 6 meters from northeast side of same, and 25 meters from the southwest angle; marked by large cairn. True bearings: Berseba Church spire, 1° 29′.3; east edge of church, 1° 28′.1; beacon near west end of north lip of crater, 186° 16′.3; beacon near east end of north lip, 204° 35′.2.

Station B was about 220 meters east of solar observatory cave, on flat piece of ground, about 15 by 25 meters, known as "the picnic place," 9 meters from south edge, and 11 meters from east edge; marked by the highest point of a conical (or limpet-shaped) rock measuring 30 by 70 centimeters at ground level. True bearings: Berseba Church spire, 2° 31′.4; east edge of church, 2° 30′.2; beacon on skyline, 181° 25′.6; second beacon on skyline, 223° 16′.0; third beacon on skyline, 299° 52′.6.

Otavi, Grootfontein, 1929.--Station of 1909 no longer suitable for observations. New station about 170 meters southeast of old, 12 meters southeast of large clump of trees, about 300 meters east of northwest corner of railroad station, 165 meters from south end of hotel, and in line with southwest side of post office; marked by the highest point of an irregularly shaped stone 15 by 25 centimeters set in ground and covered with small cairn. True bearings: flagpole at south end of hotel roof, 69° 17′.7; flagpole at north end of hotel roof, 76° 08′.7; north gable of railroad station, 94° 22′.3; knob at top of highest mountain northwestward, 148° 55′.3; east edge of fifth telegraph pole east of hotel, 332° 30′.9.

Seeheim, Keetmanshoop, 1929.--Close reoccupation of CIW station of 1916, about 700 meters northwest of railroad station, 138 meters southwest from southwest corner of monument on fenced-in grave, 143 meters north of railroad in direction perpendicular to track at milepost 196.75 which was about 125 meters east of eastern end of more easterly of two girder bridges; marked by the top edge of a wedge-shaped stone 15 by 25 centimeters at ground level, and covered with cairn. True bearings: east end of first girder bridge, 23° 15′; east end of second bridge, 40° 00′; iron pin in beacon on hill, 78° 11′.5; southwest corner of grave monument, 205° 15′.2; west gable on large house on hill, 304° 33′.9; north edge of fourth telegraph pole east of bridge, 308° 22′.0; east edge of hut on skyline, 353° 30′.2.

Swakopmund, Swakopmund, 1929.--Station of 1916 no longer suitable for observations. Two new stations established. Station A was on old military campground between town and river, 160 meters east-northeast of station of 1916, about 300 meters north-northeast of pump house, about 500 meters east-northeast of old wireless station, exactly 80 meters from small flat cement beacon, and on line joining this beacon to south window of old wireless office; not marked. True bearings: 1916 magnetic station, 160 meters, 69° 44′.0; top of cupola of Brennerei, 113° 31′.9; gable with round ventilator in line with northeast corner of barracks, 134° 22′.5; wind vane on lighthouse, 159° 03′.8; spire and chimney in line, 186° 10′.1.

Station B was 320 meters east-northeast of A, in line with A and station of 1916 and south window of old wireless office, about 850 meters south of the German School Hostel, the spike on cupola of this building being in line with spike on clock tower of German Church; not marked. True bearings: south window of wireless office, 69° 44′.0; spike on clock tower of German Church, 172° 13′.9; southwest corner of small house, 316° 27′.2.

Tsumeb, Grootfontein, 1929.--Station of 1909 no longer suitable for occupation. New station about 300 meters southwest of old, about 800 meters southwest of Minen Hotel, 480 meters southwest of southwest edge of the principal street, 100 meters northwest of line through vane on Otavi Mine Company's office and cross on German Church, and 8 meters east of thornbush with double trunk; marked by stone 10 by 10 by 25 centimeters set in ground with point projecting and covered with heap of stones. True bearings: vane on office of Otavi Mine Company, 217° 17′.7; cross on German Church tower, 222° 30′.8; right-hand edge of right-hand window in right-hand of two sheds, 150 meters, 312° 45′.5.

Windhoek, Windhoek, 1928.--Two stations were occupied. Station A was about 17 meters south of CIW station of 1916, on ridge at west edge of town, about 700 meters southwest of railroad station, 160 meters north of Elisabeth Heim nursing home in a proposed roadway along ridge, 3.2 meters from west edge of this road, and 20.2 meters south of south edge of another proposed road; marked by irregularly pointed stone 8 by 10 by 15 centimeters, covered with small cairn. True bearings: northeast corner of house, 120 meters, 142° 22′.2; 1916 magnetic station, about 17 meters, 180° 13′; small red spire in town, 0.8 kilometer, 276° 11′.8; spire of German Church, 2 kilometers, 290° 05′.6; east edge of central pillar of north veranda at Elisabeth Heim, 336° 02′.0.

Station B was 250 meters west of A, 25 meters slightly east of south from crossroads on road to Gammans, and about 400 meters northwest of Elisabeth Heim; marked by stone set in ground and covered with small cairn. True bearings: pointed top of north chimney of house, 200 meters, 243° 18′.4; German Church spire, 286° 46′.4; higher spire on Elisabeth Heim, 302° 52′.4; northwest gable of house in line with hilltop on skyline, 1.5 kilometer, 331° 57′.2.

Tanganyika Territory

Arusha, 1930.--This station was located on the K.A.R. parade ground, marked by wooden peg. True bearing: 16° 38′.6. (No description submitted.)

Dar-es Salaam, Eastern Province, 1934.--On the coast northeast of Governor's palace between main road along waterfront and the beach just beyond wire fence along north limit of palace grounds, and 27 feet (8.2 meters) from the edge of the road; marked by a stone block 6 by 6 inches (15 by 15 centimeters) set in a mass of concrete and projecting a few inches aboveground.

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Location recorded in Survey Office. True bearings: right edge of Governor's palace below cornice, 29° 15′.2; pyramidal projection on house, 350 yards (320 meters), 118° 15′.8; point of land to northward, 5 miles (8 kilometers), 171° 34′.1; top of lighthouse, 2 miles (3.2 kilometers), 239° 21′.4; point of land to eastward, 10 miles (16 kilometers), 271° 59′.0; center of signal staff on pilothouse, 0.5 mile (0.8 kilometer), 333° 59′.4.

Tabora, Western Province, 1934.--Three stations were occupied. Station A was an exact reoccupation of CIW station A of 1921, about 0.75 mile (1.2 kilometer) north-northwest of the "Boma" in a grove of mango trees in angle formed by Boma Road and Station Road, about 500 feet (152 meters) north of Railway Hotel, 70 paces north of north side of Station Road measured at right angles from a point 130 paces east of the junction with Boma Road. No mark was installed as the site is likely to be built over in the near future. True bearings: left edge of a structure resembling a pillar, at the end of a railing, 500 feet (152 meters), 43° 48′.7; left edge of white gatepost with ball top, 125° 46′.7; left support of water tower, 0.25 mile (400 meters), 251° 23′.7; south end of railway station roof, 0.25 mile (400 meters), 264° 07′.1; left edge of near end of hotel beyond main entrance, 349° 03′.8.

Station B was an exact reoccupation of CIW station B of 1921, on open grassy place south of Boma, 277 feet (84.4 meters) south of southeast corner and in line with east wall of Boma, and 5 paces north of footpath; marked by concrete block about 10 inches (25 centimeters) square projecting about a foot aboveground. True bearings: end of prison wall, 300 feet (91 meters), 25° 14′.9; bottom of southwest corner of Boma wall, 142° 04′.1; top of chimney in Boma, 154° 41′.6; bottom of southeast corner of Boma wall, 190° 25′.0; top of northeast edge of tower on residence, 400 yards (366 meters), 298° 08′.6.

Station C, established by the British East Africa Meteorological Service, was about 0.8 mile (1.3 kilometer) northeast of the Boma on the northwest edge of the airfield, roughly about 150 yards (37 meters) southeast of Hill Street at a point about 500 feet (160 meters) northeast of the point where the main rail line crosses Hill Street; marked by cement block 10 inches (25 centimeters) square and projecting about 8 inches (20 centimeters) aboveground. True bearings: left edge of tower on house, 0.75 mile (1.2 kilometer), 18° 03′.9; left edge of Boma wall, just below roof, 0.75 mile (1.2 kilometer), 33° 22′.4; left edge of stone pillar, 0.375 mile (600 meters), 45° 02′.9; left edge of stone pillar, 94 paces, 141° 53′.1; right edge of native hut across road, 0.25 mile (400 meters), 202° 20′.3.

Tripolitania

Tripoli, 1935.--Two stations were occupied. Station A was a close reoccupation of the station of 1913 and 1914 at Dahra, suburb just east of Tripoli, in an enclosure south of orphanage conducted by Catholic Sisters, 41 meters from the east wall; not marked as the location was not considered suitable for further reoccupations. True bearings: point of pyramidal chimney cover, 55° 17′.7; left edge of tall stack on brewery, 500 feet (152 meters), 68° 07′.0; right edge of house, 0.25 mile (400 meters), 79° 31′.3; left edge of orphanage building, 159° 24′.3.

Station B was located in "Parco della Runembranza" 3 kilometers due south of the fort in the center of the city. The station was reached by passing through the city gate called Porta Bir Acara and following the road straight ahead to the house of the caretaker of the forest, passing to the left of this house, and proceeding about 100 meters. The magnetic station was then seen on a knoll about 400 meters ahead.

The station was marked by a genuine antique Roman column of granite 6 feet (1.8 meters) long and about 25 inches (64 centimeters) in diameter set so that it projected about 20 inches (50 centimeters) above surface of ground. This marker was on record as being loaned by the historical office of the government. True bearings: tip of spire on cathedral, 186° 41′.6; cross on dome of same building, 187° 25′.7; center of tall smokestack near the gate "Bir Acara," 203° 48′.1; tips of three wireless masts taken in succession, clockwise, bear 215° 55′.7, 217°. 51′.9 and 220° 49′.9, respectively.

Tunisia

Tunis, 1935.--Two stations were occupied. Station A was a close reoccupation of CIW station of 1922, southwest of Tunis near shore of small lake on road to Sedjoumi, 1.5 kilometers from western gate (Bab-el-Allough) of Tunis. About 20 meters west of boundary stone 80, 30 meters south-southeast from commune domain stone on westerly side of a more or less well-defined ditch and 18 meters from approximate center of this ditch measured at right angles, and about 27 paces nearly south from a small intermediate boundary stone close to the ditch on the easterly side. True bearings: base of pole on school building, 18° 37′.8; base of sign at edge of "Champ de tir," 200° 05′.2; taller of two chimneys on a hill, 8 kilometers, 206° 03′.1; left edge of house to south-southeast, 331° 05′.1.

Station B was established to replace A which was left unmarked. B was already marked, observations being taken over boundary stone No. 81, apparently a nonmagnetic stone 8 inches (20 centimeters) square extending 6 inches (15 centimeters) aboveground. The location of this marker is accurately known by the Topographique Service who state that they will gladly relocate it, given two days' notice. It is about 186 paced meters northwest of A, 146 paced meters northwest of the smaller intermediate stone, and 132 paced meters from a prominent boundary stone marked "V.T." True bearings: "Djebel Ahmar" (beacon on highest point of mountain), 160° 55′.2; taller of two chimneys on hilltop, 5 kilometers, 207° 04′.0; "Kasbah" (cylindrical tower, base point for Tunis map), 224° 47′.9; right side of "La Manoubia" (seen between radio masts), 241° 01′.7; left one of twin peaks of mountain "Bow Kournine," 286° 38′.0; right peak of same, 286° 48′.6; prominent boundary stone marked "V.T.," 319° 32′.5; left edge of house to southeast, 331° 35′.4; base of pole on left end of Sedjoumi School, 353° 31′.0.

Uganda

Entebbe, Buganda, 1934.--Close reoccupation of Beattie's station of 1909, 20 paces due west of the

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Nsamuzi beacon on Nsamuzi Hill, 1.5 miles (2.4 kilometers) northwest of the landing pier on Lake Victoria, 0.75 mile (1.2 kilometer) north-northwest of Government House, and about the same distance southeast of the Human Trypanosomiasis Institute. The geographical coordinates of the survey beacon are: latitude, 0° 04′ 02″.75 N, longitude 32° 27′ 45″.20 E; marked by a wooden peg which was to be replaced by a cement block inscribed "CIW 1934," to be installed through the kindness of Mr. Omond, in charge of the Kololo Hill Meteorological Station, Kampala (British East Africa Meteorological Service). True bearings: right edge of water tank, 0.25 mile (2.0 kilometers), 322° 13′.8; right edge of central ventilator chimney, Human Tripanosomiasis Institute, 0.75 mile (1.2 kilometer), 138° 36′.7; right edge of beacon marker, 20 paces, 268° 47′.9.

Fort Portal, Western Province, 1934.--On same hill and 200 yards (183 meters) north of government offices, about 0.50 mile (0.8 kilometer) west of Mjara trigonometric beacon on summit of the hill near the "Mountains of the Moon" hotel; 13 feet (3.96 meters) east of the track which was the northward continuation of the north-south road past the police station, 146 paces along this road north of its crossing of the east-west road past the police station, 15 feet (4.57 meters) north of a 6 by 6 inch (15 by 15 centimeter) cement survey marker projecting 4 inches (10 centimeters) aboveground; station not marked. True bearings: extreme northwest corner of a gutter around roof of police station, 7° 33′.0; flagstaff outside District Commissioner's office, 200 yards (183 meters) distant, 341° 10′.9.

Hoima, Northern Province, 1934.--Close reoccupation of CIW station of 1909, between the District Commissioner's house and the government resthouse, on south side of Hoima-Kampala road a few yards northeast of the tennis court; 44.25 feet (13.49 meters) from south edge of the road, 159.0 feet (48.69 meters) from the first steel telegraph pole west of the resthouse, 159.75 feet (48.69 meters) from the second steel telegraph pole west of resthouse, 75 paces (69 meters) west of west end of resthouse; station not marked. True bearings: southeast end of government office roof, about 0.25 mile (0.4 kilometer) distant, 129° 35′.6; southeast corner of main mission building, 4 miles (6.4 kilometers) distant, 153° 48′.7; northeast corner of hut for native servants, 90 yards (82 meters) back of the resthouse, 325° 02′.7.

Jinja, Eastern Province, 1934.--On north side of Jinja between the Kampala road and the Ripon Falls, about 0.75 mile (1.2 kilometer) southeast of the bridge over the Nile River; between the post office and the resthouse, and 297 feet (90.5 meters) from the center of the east side of the resthouse, 318 feet (96.9 meters) from iron mast supporting wind vane, 149 feet (45.4 meters) from a solitary tree northeast of resthouse; station not marked. True bearings: center of east gable of resthouse, 82° 55′.8; west end of top girder of bridge over Nile, 0.75 mile (1.2 kilometer), 127° 22′.4; northwesterly corner of post office roof, 0.25 mile (0.4 kilometer), 246° 38′.1; iron mast at Meteorological station, 319° 02′.9.

Kampala, Buganda, 1933-1934.--Three stations were occupied. The Kololo Hill station was on the ground of the British East Africa Meteorological station at Kololo Hill which was about 1.75 mile (2.9 kilometers) north-northeast of the Kampala railway station, about 0.125 mile (200 meters) north-northwest of the observatory office building, about 700 feet (213 meters) northwest of the northwest mast of the Kololo Hill government wireless station, approximately 1 mile (1.6 kilometer) north of CIW station of 1933 on the Kampala golf course; marked by two pillars erected by the Meteorological service. True bearings: spire of Namirembe Cathedral, 2.5 miles (4.0 kilometers) distant, 57° 26′.7; gable of roof of cottage in hospital grounds, 1 mile (1.6 kilometer), 115° 30′.6; right edge of chimney on cottage, 450 feet (137 meters), 310° 15′.9; northwest wireless mast at intersection of first pair of cross braces visible above outhouse roof, 1100 feet (335 meters), 313° 25′.8.

Station of 1933 was on the Kampala golf course, marked by a brick pillar. True bearings: south wireless mast, 221° 42′.5; deep cut on a tree, 289° 12′.2.

Station of 1934 was within the foundation ruins of Lugard's Fort, 26 feet (7.9 meters) east of the west wall of fort, 35 yards (32 meters) from northwest corner of Portal monument, 2 feet (0.6 meter), north of the south edge of the cement with which the north part of the floor of the old fort was covered; station not marked. True bearings: spike on northwest corner of the protestant cathedral, 87° 59′.5; northwest corner of Portal monument, 207° 22′.4; north mast of wireless station, 232° 57′.6; north corner of guttering on more westerly of two identical houses on hillside facing fort toward northeast, 240° 59′.0; similar point on easterly house, 243° 43′.0.

Kichwamba, Western Province, 1934.--Immediately in front of the government resthouse which was on the main Mbarara-Fort Portal road just at the top of the east escarpment of the Lake Edward rift valley, 67 miles (108 kilometers) from Mbarara, 84 miles (135 kilometers) from Fort Portal; 16.8 feet (5.1 meters) northwest of fence in front of resthouse, 21.4 feet (6.53 meters) west of large tree in the fence line, 72 feet (21.9 meters) from front of resthouse, 16.8 feet (5.13 meters) south of south corner of small hut northwest of resthouse; station not marked. True bearings: Chekoba trigonometric beacon, 1.5 mile (2.4 kilometers) distant, 53° 28′.4; tree on edge of crater about 1 mile (1.6 kilometer) distant, 78° 06′.0.

Union of South Africa

Beaufort West, Cape Province, 1928.--Practical reoccupation of Beattie's station of 1899, 1900, 1905, and 1912, north of town, on road to Lemoenfontein, 400 meters north of railroad crossing, near where road led northwest, west of both main road and branch road, 25 meters west of point in center of main road which was 15 meters north of fork. True bearings: point on north gable of red-roofed house, 200 meters, 31° 17′.7; point on southeast gable of red-roofed house, 250 meters, 94° 36′.5; post on Kopje, 300 meters, 235° 23′.3; spire of Dutch Reformed Church in center of town, 1.6 kilometers, 346° 38′.0.

Bethlehem, Orange Free State, 1928.--Two stations were occupied. A was close reoccupation of CIW station of 1916, about 1 kilometer northeast of Dutch Reformed Church and town hall, on southwest slope of slight hill between town and native location, 51.6 meters east of post marking southeast corner of smaller and southern of two cemeteries, 65.7 meters southeast of post at southeast corner of larger cemetery, and 11.5 meters east of center of ditch; marked by stone set in ground with others piled on it. True bearings: concrete tower on hill, 3 kilometers, 22° 53'.0; clock tower, 1 kilometer, 46° 07'.6; stone post on hill, 6 kilometers, 93° 56'.8; station B, 800 meters, 299° 50'.4; spike on gable, 500 meters, 311° 08'.4; northeast edge of church, 200 meters, 351° 51'.4.

B was about 800 meters southeast of A, about 1 kilometer east of Dutch Reformed Church and town hall, on piece of level ground 105 meters east of one fence and 36 meters west of another, in line with left edge of white chimney of house and right edge of tower of Dutch Reformed Church, also in line with telegraph pole and lefthand of twin brick gables to southwest; marked by stone set in ground and covered by cairn. True bearings: northeast corner of vertical stone beacon on hilltop near motor-warning sign, 19° 13'.0; wind vane on clock tower of Dutch Reformed Church, 81° 41'.4; beacon nearest edge of hill, 5 kilometers, 98° 56'.0; station A, 800 meters, 119° 50'.2; stone beacon on hill 0.5 kilometer east of native location, 195° 59'.4.

Bloemfontein, Orange Free State, 1928.--Two stations were occupied. A was close reoccupation of CIW station of 1916, in Kings Park, about 1 mile (1.6 kilometer) west of city post office, about 170 meters south of fountain, 41.2 meters east of nearest point on 4 inch (10 centimeter) steel water main on west edge of road leading to fountain, 8.5 meters northeast of northeast edge of road to southwest, 3.5 meters south of ditch, and in triangle formed by 3 trees, 2.75 meters south of first tree, 2.8 meters west of second, and 4.9 meters northeast of third; marked by tent peg driven flush with ground. True bearing: peg at station B, 58.2 meters, 269° 59'.1.

Station B, a secondary station, was used for declination and astronomical observations only.

Buffel's Bay, Cape Province, 1928, 1930.--About 350 meters east of Smith's farm (Buffelsfontein) and about 75 meters northeast of path from farm to the beach, 30 meters northwest of a slight sand-hill spur; marked by stone 20 by 20 centimeters with cross scratched on top to indicate exact spot, stone covered with small cairn. True bearings: telegraph pole against skyline, 40° 18'.9; north corner of Smith's farmhouse, 90° 17'.9; telegraph pole, 109° 38'.2; navigation beacon, 278° 06'.5; old lighthouse at Cape Point, 5 kilometers, 322° 30'.9.

Cape Town Observatory, 1934.--Two stations were occupied for purposes of intercomparison of instruments, at the magnetic observatory maintained by the University of Cape Town. Simultaneous observations were obtained with exchange of stations between the magnetometer pier in the absolute hut and a point distant 31.5 feet (9.60 meters) from the center of the pier and directly in the azimuth line from this pier to the primary mark, this auxiliary station being marked by a brass rod set in a block of concrete. True bearings: spire of Wesleyan Church, Rosebank, 258° 03'.0; "University Beacon," government survey mark, 312° 38'.8; church spire in Rondebosch, 313° 52'.8; gable of distant house, 5 miles (8 kilometers), 335° 10'.0 (Primary mark adopted from observatory records).

Cape Town, Cape Province, 1927, 1934.--Four stations were occupied. A and C were close reoccupations of corresponding CIW stations of 1911, 1916, and 1920. A was on property of Valkenberg Mental Hospital southwest of Royal Observatory, southwest of bungalow of hospital superintendent, in southeastern corner of triangle formed by roads, 5.13 meters northeast of steel pole for light wire, 7.30 meters north of center of diagonal road to hospital. True bearings: center spire of three on church, 5 kilometers, 26° 37'.5; east gable of hospital lodge, 124° 06'.9; peg at station C, 22.35 meters, 137° 22'.2; center of old windmill, 213° 49'.0.

Station C was almost in line between A and southwest corner of bungalow of hospital superintendent, 26.15 meters from this corner, 21.75 meters south of steel pole for light wire, near bungalow. True bearings: center spire of three on church, 5 kilometers, 25° 37'.4; east gable of hospital lodge, 120° 57'.0; center of old windmill, 215° 54'.6; peg at station A, 22.35 meters, 317° 22'.2.

Station E was about 600 meters northwest of A and C in northwest corner of Royal Observatory grounds and nearly 2 miles (3 kilometers) north-northeast of the magnetic observatory at the University of Cape Town, on edge of high ground just south of a swampy area, 37.2 meters north-northwest of small concrete building known as "North Mark House," 84.1 meters nearly north of two old brick collimating pillars, 36.6 meters east of an iron fence, about 53 meters south of another fence; marked by a concrete block 6 inches (15 centimeters) square projecting 4 inches (10 centimeters) aboveground and inscribed "CIW E," a brass plug in the center indicating the exact spot. True bearings: northwest corner of northern of two old collimating pillars, 4° 44'.2; northeast corner of men's residence building at University, 28° 07'.9; government survey beacon at University, 30° 02'.2; corner of clockhouse near variation building of magnetic observatory, 30° 24'.4; face of horse on statue "Energy" in front of Rhodes Memorial, 35° 44'.6; edge of cable building nearest cliff on top of Table Mountain, 68° 17'.2; southwest edge of building of South African Milling Company, 112° 24'.0; east gable of white house 1 kilometer distant, 152° 23'.7. This station was definitely though not seriously affected by stray currents from electric railway lines in the vicinity, the nearest being at a distance of about 0.375 mile (0.6 kilometer).

Station F was 13.82 meters from E and in direct line between E and the northwest corner of the northern of two old brick collimating pillars and distant therefrom 70.4 meters, 34 meters east of an iron fence, and about 67 meters south of another fence; marked exactly as station E except that the letter F replaced letter E in inscription. True bearings: northwest corner of northern of two old brick collimating pillars, 4° 44'.2; face of horse on statue "Energy," Rhodes Memorial, 2.8 kilometers, 35° 54'.1; edge of cable building nearest cliff on top of Table Mountain, about 4.5 miles (7.2 kilometers), 68° 23'.1; east gable of white house, 1 kilometer, 152° 48'.9; flagpole on Standard Hotel, 1 kilometer, 193° 38'.9; nearest corner of North Mark House, 309° 41'.1.

Cradock, Cape Province, 1928.--About 400 meters east of CIW station of 1908, on corner of golf course, 35.0 meters east of wire fence east of road to Steynsburg, measured perpendicularly to fence at point

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42.2 meters north of bend in fence near north corner of ground of Training College Hostel; marked by wooden peg driven into ground and covered with small cairn. True bearings: northwest edge of Training College Hostel, 61° 35′.7; center of clock on Rockland's Hostel, 343° 09′.9; northwest corner of Rockland's Hostel, 344° 11′.1.

De Aar, Cape Province, 1928.--About 800 meters south of Beattie's station of 1900, 3 kilometers south of railroad station, in fork between railroads to Cape Town and Naauwpoort, 850 meters south of section of road to Hanover included between two railroads, in line with south side of Captain Mander's house, and 145 meters east of his east fence, 35 meters east of line of west fence of Second Avenue; marked by peg driven into ground and covered with cairn of small stones. True bearings: west edge of wall of south gable of Captain Mander's house, 98° 35′.1; telegraph pole in line with flat-topped hill, 286° 38′.5.

Durban, (The Bluff), Natal, 1928.--Practical reoccupation of Beattie's station of 1903 and CIW station of 1916, about 170 meters south of station of 1916, on side of harbor of Port Natal opposite city of Durban, on leveled piece of ground 7 by 5 meters, 24 meters west of ridge of "Bluff," at point 24 meters north of highest point, and 48 meters west of telegraph pole; marked by piece of wood 40 centimeters long and 8 centimeters in diameter set vertically in ground, this stake to have concrete placed around it later by caretaker. True bearings: left edge of high part of grain elevator, 89° 33′.2; east edge of high part of grain elevator, 89° 41′.8; right edge of high part of grain elevator, 89° 58′.4; spike on left of two domes above north corner of harbor, 123° 55′.3; slit in time ball mast, 213° 00′.6; mainmast of flagstaff 10 feet (3 meters) above crosstrees, 223° 09′.2; weather vane of lighthouse, 226° 02′.6; west gable of cottage, 150 meters, 230° 40′.6; west gable of caretaker's cottage, 80 meters, 243° 02′.2.

Durban, Natal, 1934.--Close reoccupation of CIW station of 1928, southeast of Durban Bay on point of land known as the "Bluff," about 0.25 mile (0.4 kilometer) southwest of lighthouse, about 4 meters, measured at right angles, northwest of the highway around Durban Bay at a point about 10 meters toward the lighthouse from the "Bluff" survey beacon which was close to the road on the southeast side, distant 16 meters from the "Bluff" beacon, and 80 meters southwest of the southwest corner of the caretaker's cottage; marked by a mound of stones, the base stone of dimensions 6 by 12 by 24 inches (15 by 30 by 61 centimeters) having a cross scratched on it to mark the exact spot. True bearings: right edge of high part of grain elevator, 2 miles (3 kilometers), 89° 55′.0; ball on dome of Howard College, 3 miles (5 kilometers), 97° 46′.8; spike on left of two domes, 2 miles (3 kilometers), 123° 53′.4; north edge of next to last hotel on beach, 2 miles (3 kilometers), 148° 31′.6; west gable of caretaker's cottage, 243° 38′.4.

East London, Cape Province, 1928, 1934.--Two stations were occupied. Station A was proximate reoccupation of Beattie's stations of 1902 and 1911, on the golf course about 2 miles (3 kilometers) north of the Beach Hotel, about 0.4 mile (0.6 kilometer) due east of clubhouse, on level part of small ridge running in northeast-southwest direction just east of the seventh fairway, 55 yards (50 meters) south of the seventh green, 240 yards (220 meters) northeast of the seventh tee and about 16.5 yards (15 meters) west of the backbone of the ridge mentioned; marked by a sandstone post 7 by 5 by 24 inches (18 by 12 by 60 centimeters) projecting about 5 inches (13 centimeters) aboveground. This station exactly reoccupied in 1934. True bearings: left edge of chimney on clubhouse, 0.4 mile (0.6 kilometer), 96° 02′.6; right edge of same chimney, 96° 06′.6; left edge of chimney of house adjoining clubhouse, 98° 20′.0; left edge of single story house on hill, 1.25 mile (2 kilometers), 160° 33′.0; right edge of same house, 161° 22′.8.

Station B, also on the grounds of the country club, was about 492 yards (450 meters) northwest of A, 0.4 mile (0.6 kilometer) northeast of clubhouse, on a slight rise north of the fence along the northern boundary of the golf course, about 350 feet (107 meters) measured at right angles from this boundary fence, about 15 feet (4.5 meters) south of a steep slope down to the rifle range, about 45 feet (13.7 meters) southwest of a lone tree, and 60 feet (18 meters) from the nearest tree toward the west; marked by a sandstone post, 5 by 7 by 24 inches (13 by 18 by 61 centimeters), projecting 5 inches (13.5 centimeters) aboveground. Close reoccupation, 1934. True bearings: top right edge of tank, 1.3 mile (2 kilometers), 82° 21′.1; right edge of house, 0.7 mile (1.1 kilometer), 153° 34′.3; right edge of shed, 400 feet (122 meters), 160° 37′.1; south corner of roof of hut with tank, 0.8 mile (0.5 kilometer), 251° 16′.8.

Eendekuil, Cape Province, 1930.--Practical reoccupation of Beattie's station of 1907, about 700 meters southwest of railroad station, on north bank of river opposite railroad milepost 128, 83 meters from north bank of river, 65 meters from wire fence parallel to riverbank, 4 meters southwest of continuation of long fence to the southeast across railroad, about 75 meters south of another wire fence, and about 65 meters northeast of large anthill. True bearings: northwest corner of large shed near railroad, 55° 20′.2; south edge of most southerly building on farm, 63° 51′.8; beacon on highest point of north end of Picquetberg Range, 98° 18′.3; railroad milepost 128, 328° 57′.0; northwest corner of masonry at east end of small bridge under railroad, 353° 56′.6.

Gingindhlovu, Natal, 1928.--Two stations were occupied. A is about 400 meters south of CIW station of 1916, on town land, about 700 meters south of railroad station, and was reached by crossing stream at point 300 meters southeast of hotel and then following footpath southward 230 meters to road, which in turn was followed 100 meters to west to point 30 meters beyond small stone bridge, from which point station was 50 meters to southwest at right angles to road; marked by highest point of stone 20 by 30 centimeters set in turf and covered by number of smaller stones. True bearings: northwest corner of house on hill, 1 kilometer, 170° 37′.9; spike on southeast gable of hotel bar, 500 meters, 195° 24′.6; first telegraph pole to south of stream, 240 meters, 237° 57′.7; northwest corner of house on hilltop among trees, 2 kilometers, 241° 50′.2; central chimney of large house on hill, 8 kilometers, 289° 19′.8; station B, 55 meters, 321° 49′.0; foot of telegraph pole, 200 meters, 327° 09′.2.

B was on opposite side of stream bed from A. True bearing: station A, 55 meters, 141° 49′.0.

Hutchinson, Cape Province, 1928, 1930.--Two stations were occupied. A was close reoccupation of CIW

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station of 1908 and of Beattie's station of 1898, 1899, 1900, 1904, 1911, on farm of Imperial Cold Storage Company, east of railroad station, and 160 meters northeast of northeast fence of old road to Murraysberg, 8 meters west of shallow ditch and 40 meters south of where rough track crosses this ditch; marked by concrete block about 35 centimeters square, lettered on top "U.C.T. 1928," an inscribed cross marking the exact point. True bearings: beacon on mountain-like truncated cone, 16.8 kilometers, 62° 21'.9; northeast edge of farm, in line with conical hill on skyline, 67° 05'.0; windmill to left of hotel, 875 meters, 110° 18'.3; northeast edge of hotel tearoom, 850 meters, 112° 19'.8; northeast edge of goods shed at north end of station, 788 meters, 115° 19'.3; windmill, 1323 meters, 138° 44'.2; theodolite station, 50.00 meters, 175° 51'.0.

B was about 1500 meters northwest of A, on opposite side of railroad, about 800 meters northwest of hotel, about 200 meters southwest of railroad to Victoria West, about 500 meters south of railroad bridge, 58 meters southeast of road to van Heerden's farm, measured perpendicular to road at point 60 meters northeast of northeast bank of small stream crossed by road; marked by large stone with "U.C.T. 1928" and cross scratched on it and surrounded by cairn of smaller stones. True bearings: north edge of pump house, 200 meters, 140° 59'.7; gradient post on railroad, 218° 32'.1; east edge of nearest house of I.C.S. farm, 225° 02'.1; windmill, 276° 51'.7; north corner of goods shed at north end of station, 800 meters, 320° 41'.3.

Johannesburg, Transvaal, 1935.--Southwest of Johannesburg, on main highway, halfway between Johannesburg and Potchefstrom, 33 miles (53 kilometers) airline from center of Johannesburg, about 300 feet (90 meters) north of main highway in an open field. Should be located through New Consolidated Goldfields, Ltd., P.O. Box 1167, Johannesburg. Station was to have been marked by this company. True bearings: survey beacon DK6, 10° 03'.0; Doornkloof survey beacon, 44° 29'.8; survey beacon DK5, 48° 31'.7; Dreifontein survey beacon, 70° 15'.4; top, center of derrick, borehole 14 (or 13?), 100° 21'.4; right edge of white house, 109° 01'.5; top, center of derrick, borehole 13 (or 14?), 179° 34'.3.

Karree, Orange Free State, 1928.--Two stations were occupied. A was close reoccupation of Beattie's station of 1903, 1911, south of railroad station, 102 meters south of south fence bounding railroad property, almost in line with west edge of signal cabin, and about 7 meters east of shallow ditch. True bearing: spike on gable of school, 168° 13'.3.

B was 235 meters southwest of A, 0.4 kilometer south of railroad station, on wide ledge halfway up slope of small ironstone hill, 330 meters south of south fence bounding railroad property, 14 meters east of tree on ledge, and 40 meters north of tree at top of hill; marked by "U.C.T. 1928" and cross inscribed on surface rock about 50 centimeters square, the cross indicating the exact point. True bearings: northwest corner of stationmaster's house, 160° 18'.5; V between table mountain and conical mountain, 20 kilometers, 187° 36'.5; west end of flat top of conical mountain, 50 kilometers, 129° 59'.5; west edge of north outer-home signal post, 196° 13'.0.

Machadodorp, Transvaal, 1930.--Close reoccupation of Beattie's station of 1903, about 0.8 kilometer northwest of town hall, on flat tongue of land surrounded on the north by a stream and on the other three sides by a ditch, 24 meters south of large trees 4 meters inside north fence, 17 meters from fence due east, and 24 meters from fence due west; not marked. True bearings: left-hand vertical edge of culvert under railroad, 75° 56'.9; north end of top ridge of big roof to left of Christ Church, 287° 25'.7; wind vane on new Dutch Reformed Church, 343° 07'.5; right edge of chimney, about 200 meters, 352° 37'.6.

Mafeking, Cape Province, 1930, 1935.--Two stations were occupied. Station A, occupied in 1930 and very closely reoccupied in 1935, was about 100 meters southwest of Beattie's station of 1903, 1906, 1909, and 1911, 0.33 mile (0.5 kilometer) east of railroad station, on playground of Mafeking school, 56 feet (17 meters) from northeast fence, 215 feet (65 meters) from southeast fence, 500 feet (150 meters) from east corner of schoolhouse and 10 feet (3 meters) southeast of line of southeast wall of schoolhouse; marked by underground block of cement with top 8 inches (20 centimeters) below surface of ground, a pyramidal projection of brick on upper surface indicating exact point. True bearings: (1935 values) spire of Roman Catholic Church, 52° 40'.0; finial on house, 55° 45'.0; flagpole on cupola of schoolhouse, 70° 38'.9; spire on town hall, 83° 25'.4; top of roof, near end, 133° 25'.0; finial on near end of house, 330 feet (100 meters), 206° 33'.8; left edge of electric substation, 316° 02'.8.

Station B was on the same grounds, 340 feet (104 meters) southwest of A, in line with northeast faces of two small outhouses, 154 feet (47 meters) southeast of the near wall of the nearer of these outhouses, 112 feet (34 meters) from fence on southeast side of grounds, and 197 feet (60 meters) from east corner of schoolhouse; marked by underground block of cement with top 8 inches (20 centimeters) below surface of ground, a pyramidal projection of brick on upper surface of block indicating the exact point. True bearings: spire of Roman Catholic Church, 56° 26'.3; flagpole on cupola of schoolhouse, 95° 31'.3; line of northeast sides of two outhouses in line, 151° 15'.0; left edge of small yellow shack, 0.25 mile (400 meters), 184° 19'.8; finial on near end of house, 214° 04'.6; station A, 340 feet (104 meters), 225° 06'.3; left edge of electric substation, 256° 29'.1. For permission to observe see headmaster of school.

Matjesfontein, Cape Province, 1927-1928, 1930, 1933.--Two stations were occupied. A was practical reoccupation of CIW station of 1908, 140 meters west of road to Sutherland and 450 meters north of railroad; marked by concrete block 1 foot (30 centimeters) square, projecting 1 inch (2.5 centimeters) above surface of ground, with pointed white stone in center, and with the inscription "U.C.T. 1928" on top of surface. True bearings: east end of masonry of small bridge under railroad, 5° 55'.7; triangulation station, 50.00 meters, 31° 14'.0; station B, 500 meters, 67°; telegraph pole on top of first rise on road to Sutherland, 238° 56'.6; beacon on top of conical mountain, 252° 57'.6; second telegraph pole, 258° 12'.4; third telegraph pole, 287° 35'.5; fourth telegraph pole, 316° 17'.2; fifth telegraph pole, 335° 00'.2; northeast edge of central tower of Hotel Milner, 336° 48'.2; sixth

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telegraph pole, 346° 05'.8; flagstaff in garden of Mrs. Logan Senior, 350° 40'.0. A round of angles at "triangulation station" gave true bearings as follows: east end of masonry of small bridge under railroad, 3° 49'.9; station A, 50.00 meters, 211° 14'.0; telegraph pole at top of first rise on road to Sutherland, 234° 13'.8; second telegraph pole, 248° 36'.6; beacon on top of conical mountain, 252° 35'.9; third telegraph pole, 271° 47'.4; northeast edge of central tower of Hotel Milner, 333° 12'.7.

B was in bare sandy space 0.5 kilometer northwest of west end of railroad station, 140 meters southwest of path leading northwest from railroad station, and 300 meters north of Baviaans River; marked by wedge-shaped stone 1 foot (30 centimeters) long, 8 inches (20 centimeters) high, set in ground with sharp edge up, pointing east and west, notch in middle of upper edge indicating exact point. True bearings: telegraph pole at top of first rise on road to Sutherland, 244° 44'.3; station A, 500 meters, 247°; second telegraph pole, 250° 07'.5; beacon on top of conical mountain, 252° 28'.0; northeast edge of central tower of Hotel Milner, 299° 12'.9; east end of masonry of small bridge under railroad, 315° 17'.1.

Mooi River, Natal, 1928.--Located 800 meters west of railroad station, 100 meters south of road leading west past Argyle Hotel, 50 meters west of branch road leading south, in middle of field belonging to Mr. Abbott. True bearings: northeast edge of northern of three red brick houses on hill, 3 kilometers, 276° 06'.6; spike on roof above center arch on farm, 3 kilometers, 342° 20'.6.

Mossel Bay, Cape Province, 1928.--On hill south of town, about 75 meters east of "show ground," about 40 meters south of road running parallel to escarpment overlooking town, about 600 meters southeast of survey beacon at Cape St. Blaize on north side of road, and above the highest part of a fairly flat surface rock; an attempt was made to scratch a marking on this rock. True bearing: survey beacon at Cape St. Blaize, 223° 44'.6.

Orange River, Cape Province, 1928, 1930, 1934.--Two stations were occupied. Station A was practical reoccupation of CIW station of 1908, about 650 meters west of north end of Orange River railway station, 120 meters south of fence on south side of road to Hopetown, on private land, property of Mr. du Toit; marked by a large flat stone set flush with the ground, having "U.C.T. 1928" scratched on the surface and covered with cairn (all except base stone removed during observations). True bearings: station B, 4° 47'.2; survey beacon, 1.5 kilometer, 251° 51'.0; survey beacon, 5.9 kilometers, 267° 30'.8; left edge of school building under eaves, 271° 31'.1; northwest edge of cottage near store, 271° 53'.4; tip of monument, 342° 57'.0.

Station B was distant 480 meters from A, about 0.7 kilometer west-southwest of railroad station, 27 meters southeast of slight offshoot of old trench running approximately at right angles to railroad and about 165 meters west of a rough circular stone shelter on a small hill; marked by a large flat stone set flush with the ground and covered by a mound of stones, a cross scratched near the center of base stone marking exact spot. True bearings: station A, 184° 46'.6; telegraph pole almost in line with round tree, 214° 04'.1; left edge of schoolhouse, 226° 01'.1; northwest corner of cottage near store, 229° 01'.4; survey beacon, 2 kilometers, 238° 51'.5; survey beacon, 5.9 kilometers, 262° 56'.8. Co-ordinates of this more distant beacon: latitude 29° 39' 53".4 S, longitude 24° 15' 47".1 E, obtained from Survey Office in Cape Town.

Potgietersrust, Transvaal, 1930.--Two stations were occupied. Station A was close reoccupation of CIW station of 1908, on fenced lot south of Horwitz's store and north of his house, 21 meters west of the east fence of the lot, and 10 meters south of the north fence, the northeast corner of this lot being about 110 meters west of railroad; marked by peg driven into ground and covered by a gray stone with smaller stones piled around. True bearings: finial of Horwitz's house, 16° 41'.2; rock or beacon on skyline, 50° 33'.4; north edge of two-story building, 135° 16'.8; right edge of Horwitz's store, 234° 55'.4; near edge of window on north side of house, 100 meters, 321° 41'.3; railroad signal post, 334° 40'.6.

Station B was about 0.5 kilometer west-southwest of railroad station, in Joubert Park, between Rugby football ground and tennis courts, 102, 98, and 90 meters, respectively, from the west, south, and east boundary fences of the park, 38 meters from the nearer of two left-hand goal posts in line with magnetic station, and 37 meters from tennis court fence in opposite direction; marked by a tent peg driven into ground and covered with a flat stone measuring 15 by 20 centimeters. True bearings: northeast corner of Queen's Hotel (main building), 32° 54'.4; northeast corner of Waldorf Café, 86° 38'.5; middle of private road in line with magnetic station, approximately 108°; left-hand goal posts in line, 190° 30'; southeast corner of ladies' lavatory, 252° 38'.7; northeast corner of small concrete storehouse on tennis courts, 343° 58'.9.

Pretoria, Transvaal, 1930, 1935.-- Five stations were occupied. Station A was a practical reoccupation of Beattie's station of 1903 and 1908, in Princess Christian Park about 1.2 kilometer west-southwest of Church Square, reached by proceeding 95 meters west from Schoeman Street entrance to park, thence 75 meters south to magnetic station; marked by a square wooden peg driven flush with surface and covered with flat stone 25 by 20 by 8 centimeters. True bearings: right edge of left of two brick buildings, 120 meters, 67° 07'.9; left edge of right building, 73° 42'.3; left edge of white house, 120 meters, 279° 08'.7; right edge of white house to right of gate leading to tennis courts, 140 meters, 309° 49'.3.

Station B was 33 meters northwest of A and may be reached by proceeding about 107 meters west from Schoeman Street entrance to park, thence about 47 meters south to station; 31 meters north of an iron fence, about 10 meters from edge of a path to north, and 7 meters south-southwest of a small triple tree; marked by a granite post 30 by 30 by 90 centimeters projecting slightly aboveground and inscribed "Magnetic Station CIW 1935, Do Not Remove," a drill hole near center indicating the exact spot. True bearings: left edge of left goal post, 130 meters, 13° 21'.5; right end of right railing on wooden bridge, 139° 59'.2; left edge at top of right gate post of Schoeman Street gate, 243° 15'.7; left edge of iron pole at base, at corner of Park Avenue and Skinner Street, 308° 17'.8; top of gable of house near same intersection, 312° 30'.9.

Station C was 33 meters southeast of A and in line with A and B, 29 meters south of iron fence cutting off

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an area of grass land in south corner of park, and about 44 meters north of iron fence at south boundary of park; not marked. True bearings: top insulator, 400 meters, 87° 30′.2; right end of railing on right side of wooden bridge, 142° 27′.7; right edge of ruin on hill, 5 kilometers, 171° 32′.1; left edge of projection on left end of top of house roof, 252° 09′.4; right edge of base of iron pole, 295° 42′.1.

Station D was on the grounds of the University Experimental Farm about 8 kilometers east of Church Square, about 1.5 kilometers east-northeast of the farm office building, 1 kilometer northeast of Struben Kop, about 1.5 kilometer southeast of railway, 400 meters southeast of two low iron animal sheds, near the fork of a road leading from the farm buildings and midway between the north and south divisions, 116 meters north-northwest of a small iron target shed, 71 meters west-southwest of a lone tree and 9.1 meters east of a large lone shrub; marked by a granite post 30 by 30 by 90 centimeters, projecting slightly aboveground and inscribed "Magnetic Station CIW 1935, Do Not Remove," hole in center of top indicating the exact spot. True bearings: center of Struben Kop survey beacon, 1 kilometer, 58° 26′.5; top of right dome of Union Buildings, 6 kilometers, 99° 17′.7; right edge of Government House, 4 kilometers, 107° 22′.3; right edge of house, 2.5 kilometers, 110° 15′.4; right edge of ruin (?) on hill, 11 kilometers +, 122° 04′.7; survey beacon on same hill, 122° 13′.6; left edge of iron shed beyond two trees, 400 meters, 143° 45′.4; left edge of projection on left end of large red-roofed building, 1.5 kilometers, 176° 42′.6; magnetic station E, 103 meters, 187° 59′.0; left edge of lone tree, 71 meters, 254° 58′; left edge of small iron target shed, 115 meters, 340° 33′.8.

Station E was approximately 103 meters north of D, 174 meters north of small iron target shed, 100 meters north-northwest of lone tree, and 114 meters slightly east of north of large lone shrub; marked by a granite post 30 by 30 by 150 centimeters, projecting slightly aboveground, and inscribed "Magnetic Station CIW 1935, Do Not Remove," a drill hole near center indicating the exact point. True bearings: magnetic station D, 103 meters, 7° 59′.7; center of Struben Kop survey beacon, 1.2 kilometer, 54° 41′.5; top of left dome of Union Building, 6 kilometers, 98° 10′.0; right edge of Government House, 4 kilometers, 105° 50′.6; right edge of house, 2.5 kilometers, 108° 13′.6; right edge of ruin (?) on hill, 11 kilometers, 121° 36′.3; survey beacon on same hill, 11 kilometers, 121° 45′.0; left edge of iron shed behind two trees, 400 meters, 130° 56′.8; left edge of projection on left end of large red-roofed building, 1.5 kilometer, 175° 52′.7; left edge of lone tree, 100 meters, 326° 09′.

Queenstown, Cape Province, 1928.--About 2 kilometers southwest of Hexagon at center of town, 250 meters northwest of road, measured perpendicularly to road from point just south of Lamont bridge, and 150 meters northeast of another road which intersects first road at right angles; marked by wooden peg and small heap of stones; permanent concrete mark to be put in by electrical engineer of town. True bearings: north edge of glass of windows in ventilator of abattoir, 300 meters, 7° 25′.7; electric-power standard, 250 meters, 309° 50′.7; vertical part of skyline on left-hand summit of twin peaks (Inda Mungain), 327° 24′.8.

Springfontein, Orange Free State, 1928.--Close reoccupation of Beattie's station of 1903, about 500 meters northeast of north end of platform at railroad station, 76 meters south of wire fence running east and west, measured from point opposite angle in another wire fence which is 20 meters farther north and which encloses some small pine trees, 97 meters from fence to south, and about 360 meters from railroad; marked by flat stone 25 by 70 centimeters, set east and west in ground and lettered "U.C.T. 1928," cross 21 centimeters from east end and 14 centimeters from south side marking exact point. True bearings: west side of base of outer-home signal, 1 kilometer, 4° 41′.9; pointed ventilator on building near railroad station, 450 meters, 50° 40′.9; spike on north gable of large gray building, 83° 57′.2.

Uitenhage, Cape Province, 1928.--About 800 meters north of Beattie's station of 1900 and 1904, about 200 meters west of golf clubhouse, and 80 meters west of fence west of cemetery; marked by hole 40 centimeters square dug in ground, wooden peg in center of hole, surrounded by stones filling hole (to be filled later with concrete). True bearings: farthest visible fence pole on road to north, 163° 07′.0; beacon A at northeast corner of Dower College grounds, 107.80 Cape roods (407.30 meters), 304° 27′.6; beacon B at northwest corner of Dower College grounds, 88.03 Cape roods (332.60 meters), 322° 34′.4.

Beacon B was 36.49 Cape roods (137.87 meters) from beacon A, in azimuth 75° 52′.0.

Van Rhynsdorp, Cape Province, 1930.--Occupied by Beattie in 1907, but no description of his station available. New station located 0.5 kilometer southeast of Dutch Reformed Church in middle of town, among small trees, 9 meters west of an old earthwork, 4 meters east of a small stream bed, and about 100 meters south of building containing donkey mill on small farm of Mr. Kruger, reached by following road to Klaver to point 150 meters south of the ford over "True True" River, then 250 meters east through both goals of football field; marked by wooden peg driven in ground and covered with small cairn. True bearings: highest obelisk in graveyard, 122° 09′.3; steeple of Dutch Reformed Church, 165° 25′.7; finial, 232° 39′.0; top of small breast-shaped mountain on skyline, 282° 04′.9; vertical rock face above overhang on right-hand edge of mountain to south, 339° 10′.9.

Warrenton, Cape Province, 1930.--Close reoccupation of Beattie's station of 1903, on right-hand side of Kimberley to Vryburg railroad, northward along railroad track 85 meters from end of station platform then to right 112 meters from railroad, 22 meters from fence of football field at point 1 meter north of "winding-post" in fence; not marked. True bearings: signal post, 1 kilometer, 37° 32′.8; finial above round ventilator on station building, 75° 28′.1; left edge of row of iron houses across railroad, 166° 30′.6; left edge of flat-roofed iron shed, 352° 46′.4; right edge of same, 355° 15′.4.

Willowmore, Cape Province, 1928.--On northwest bank of river, 750 meters northwest of railroad station, 200 meters south of more southerly road to Prince Albert, 29 meters south of south bank of stony stream bed running east and west, 22 meters northeast of top of small bay in riverbank and 50 meters west of another longer bay opposite long embankment, 4.5, 15, and 19 meters, respectively, southeast of 3 Mimosa bushes; marked by wooden peg driven in ground and covered by cairn. True bearings:

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telegraph pole nearly in line with Kopje (hillock) nearest town, 200 meters, 189° 57′.3; telegraph pole in line with right-hand edge of right-hand window of small concrete shed, 234° 36′.1; center spire of five on Dutch Reformed Church, 1.8 kilometer, 251° 56′.2; gable on middle of railroad station, 750 meters, 329° 03′.9.

Wolseley, Cape Province, 1930.--The station of 1908 could not be recovered. The new station was southwest of Wolseley Hotel, west of junction of railroad lines to Ceres and Worcester, about 80 meters northwest of junction of two roads, one leading to the plantation and the other towards the railroad junction, about 15 meters northwest of rough track, in line with a telegraph pole and the beacon on top of a distant mountain; marked by tent peg covered with small cairn. True bearings: beacon, 36° 11′.4; beacon on mountain in line with west edge of telegraph pole, 154° 05′.0; beacon on Little Winterhoek Mountain, 170° 36′.0; highest monolith in graveyard, 174° 19′.3; northeast corner of brickwork of railroad tank, 241° 03′.0; southwest corner of small house, 325° 46′.4.

ASIA

Arabia

Aden, 1935.--Two stations were occupied. Station B was a close reoccupation of CIW station B of 1921 which was the British Admiralty magnetic station of 1909. On Arabian mainland across Aden harbor, about 2.5 miles (4 kilometers) north of Prince of Wales pier, exactly in line with a line of three wireless masts near the aerodrome, and also in line to Sham-sham signal mast passing directly over the small peninsula Ras Hedjuff. True bearings: minaret at Sheik Othman, 5 miles (8 kilometers), 210° 39′.8; beacon on small island, 303° 21′.4; Sham-sham mast, 3 miles (4.8 kilometers), 323° 55′.0; clock tower in Aden, 2.5 miles (4.0 kilometers), 344° 51′.0; signal station mast, 351° 39′.4.

Station C was on the grounds of the aerodrome on the east side of the bay of Aden, near west side of airfield; about 43 feet (13 meters) from high-water mark on the beach, 72 yards (66 meters) south-southeast from a concrete shelter, and 175 yards (160 meters) north of present wind indicator; marked by concrete monument 12 by 12 by 48 inches (30 by 30 by 122 centimeters), a drill hole marking exact spot, and lettered "MS, 1935." True bearings: Sham-sham signal mast, 11° 47′.9; beacon mast on high hill, 36° 54′.1; left edge of concrete shelter, 72 yards (66 meters), 143° 04′.1; right edge of water tank, 500 yards (450 meters), 294° 06′.9; right edge of target backstop, 175 yards (160 meters), 333° 13′.0.

Bahra, Kowait, 1937.--About 450 meters due west of a 4 inch (10 centimeter) iron pipe set in ground which was the point of origin of the Kowait Oil Company's survey. This iron pipe was about 100 meters southwest of location of well No. 1, drilled by the Kowait Oil Company. True bearing: iron pipe at point of origin, 270° 00′.0.

Gahlula, Kowait, 1937.--About 775 meters N 21° 41′.6 E of T85, Kowait Oil Company survey and about 300 meters north of the geophysical party camp site at Kahlula. True bearing: 4 inch (10 centimeter) iron pipe at T85, 21° 41′.6.

Kowait, Kowait, 1937.--West of the town and approximately 700 meters southwest of the Jahra Gate, 302 meters west from south end of old wall of abandoned building, 315 meters south of T17 (Kowait Oil Company Survey), and 170.1 meters south of center line of Kowait-Jahra road; marked by a 4 by 4 inch (10 by 10 centimeter) stake projecting about 20 centimeters aboveground. T17 is on highest point of large sand hill and marked by a 4 inch (10 centimeter) iron pipe. True bearings: center chimney of large two-story building, about 700 meters, 83° 47′.0; T17, 184° 02′.2; center of Jahra Gate, 233° 10′.0; base of lone tree, about 800 meters, 254° 19′.0; south corner of old wall of ruined building, 302.2 meters, 278° 11′.0; telegraph pole, about 160 meters, 338° 17′.0.

Madaniyat, Kowait, 1937.--About 2.9 kilometers S 9° 09′.6 E of triangulation station T24 of the Kowait Oil Company Survey, on Madaniyat Hill and about 300 meters N 9° 09′.6 W of T26. These triangulation points were marked by 4 inch (10 centimeter) iron pipes; magnetic station marked by a wooden stake. True bearing: triangulation station T26, 350° 50′.4.

Baluchistan

Nok-Kundi, 1928.--On plain, 800 meters north of railroad station, 80 meters north of north wall of separate kitchen of political bungalow joined with fort by road; marked by pile of stones. True bearing: telegraph pole on railroad track, 353° 03′.8.

Nushki, 1928.--On site of fortified political bungalow, on lone hill 20 meters high in desert west of village, 40 meters southeast of southeast corner of bungalow, and 2 meters west of road leading to machine-gun stand; marked by pile of stones. True bearing: principal minaret in center of village, 1 kilometer, 259° 56′.6.

China

Canton, Kwangtung, 1935.--Practical reoccupation of CIW stations of 1921-1922, on football field east of campus of Lingnan University, in line between the two south goal posts and midway between them, 47.00 meters from south goal post to east, and 35.50 meters from south goal post to west; marked by stone post 6 by 6 by 16 inches (15 by 15 by 41 centimeters) set with top 4 inches (10 centimeters) below ground level and lettered "CIW 1935" with drill hole in top to indicate exact spot. True bearings: clock tower ornament on top of Grant Hall, 116° 22′.4; center of chimney at left end of Dr. Knipp's house, 90 meters, 167° 23′.6; pagoda to northeast, 3 kilometers, 254° 14′.0; northeast edge of girls' dormitory, 180 meters, 312° 53′.0.

Changsha, Hunan, 1932.--Three stations were occupied. Station A was a close reoccupation of CIW station of 1907, 52.33 feet (15.96 meters) north of 1907 station, in middle of vegetable garden in northwest corner of compound of residence of the Commissioner of Customs which was on the island in the river opposite the city of

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Changsha, 24.58 feet (7.50 meters) from west wall of compound, 50.17 feet (15.30 meters) from northeast corner of north pillar of back gate, and 15 paces from north wall of compound; marked by a granite post 3 by 3 by 17 inches (8 by 8 by 43 centimeters) projecting 3 inches (8 centimeters) aboveground with cross on top surface to indicate exact spot. True bearings: bottom of left side of chimney of long building to south, 2° 45′.2; northeast corner of north pillar of back gate, 41° 52′.1; southwest edge of Commissioner's residence at point 2.5 feet (76 centimeters) aboveground, about 200 feet (60 meters), 318° 43′.1; bottom left edge of distant chimney, about 800 feet (240 meters), 328° 40′.0.

Station B was near the southeast corner of the campus of Yale-in-China, on grass plot south of dormitory, and northeast of Science Building, 12.3 feet (3.75 meters) from middle of cinder track to the east, 14.3 feet (4.36 meters) from middle of cinder track to the west, 40.7 feet (12.41 meters) from fence around house to the west, 51.8 feet (15.80 meters) from northeast corner of outbuilding, and 126 feet (38 meters) from dormitory to the north; marked by a brick sunk flush with ground. True bearings: top right edge of Medical College, 800 feet (240 meters), 5° 34′.7; left edge of O-P.D. building of hospital, 800 feet (240 meters), 9° 37′.3; ornament on Science Building, 66° 32′.8; ornament on belfry of chapel, 120° 17′.4; northeast corner of nearby outbuilding, 140° 23′.3; ornament on dormitory, 185° 42′.5.

Station C was a secondary station on college campus of Yale-in-China, on grassland between southwest bend of running track and fence forming west boundary of campus, about 120 feet (37 meters) southeast of faculty residence No. 10, 14.7 feet (4.48 meters) from nearest point of fence to west, 21.8 feet (6.65 meters) from center of running track, 67.8 feet (20.68 meters) from left post of gateway, 132 feet (40.3 meters) from westernmost goal post at south end of athletic field, and 234.4 feet (71.49 meters) from northwest corner of recitation hall; marked by a granite post 8 by 8 by 16 inches (20 by 20 by 40 centimeters) sunk flush with the ground and inscribed with a cross to indicate the exact spot. Owing to constant rains no azimuths or true bearings were possible.

Changte, Honan, 1932.--Two stations were occupied. Station A was exact reoccupation of CIW station of 1907, about 300 meters northeast of northeast corner of Canadian Presbyterian Compound, on burial ground surrounded by cultivated fields, and indicated by group of ten cedar trees, 7.3 feet (2.23 meters) from nearest tree to east, and 13.7 feet (4.17 meters) from nearest tree to west; marked by stone, rounded off on top, which was middle one of three remaining boundary stones along line of most southern row of trees, a hole in top of stone indicating the exact spot. True bearings: left edge of south classroom of girls' school, 18° 47′.0; left edge of red roof of ladies' residence at highest point, 27° 54′.2; northeast corner of wall of Canadian Presbyterian Compound, 35° 22′.2.

Station B was about 500 meters southwest of A, on playground in southwest corner of Canadian Presbyterian Compound, 138.5 feet (42.24 meters) from south wall of playground, and 194.5 feet (59.32 meters) from west wall of playground; marked by stone, 5 inches (13 centimeters) square, buried under brick on football field about 9.5 inches (24 centimeters) underground. True bearings: left edge of city tower, 33° 30′.8; middle of kitchen chimney at extreme southwest corner of compound, 62° 46′.3; left edge of school at northeast corner of playground, 215° 51′.4.

Chengchow, Honan, 1932.--Two stations were occupied. Station A was close reoccupation of CIW station of 1922, in south corner of property of Southern Baptist Mission, in east corner of compound enclosing the former Herring residence, 57.15 feet (17.43 meters) to east corner of compound wall, 80.35 feet (24.51 meters) from east corner of Herring House, and 28.4 feet (8.66 meters) from west edge of third pillar along northeast wall counting from east corner; marked by a wooden tent peg driven flush with ground. True bearings: southernmost of three chimneys on house, 0.25 mile (0.4 kilometer), 72° 41′.0.

Station B was exact reoccupation of CIW station of 1922, in foreign cemetery belonging to Southern Baptist and Free Methodist Missions, near east edge of small circular plot near center of cemetery; marked by hollow gray stone 7 by 7 by 24 inches (18 by 18 by 61 centimeters). True bearings: left edge of gray wall at point of intersection with inclined wall in front of red building to southwest of cemetery, 39° 20′.6; top of pavilion ornament to south of cemetery, 357° 46′.8.

Chengtu, Szechwan, 1934.--Two stations were occupied. Station A was close reoccupation of CIW station of 1916, about 80 feet (25 meters) southwest of former site, about 1 mile (1.6 kilometer) south of center of city, on grounds of West China Union University which was outside eastern section of south wall, on open ground southwest of administration building, east of Vandeman Memorial Building, north of Hart Memorial Hall, exactly in line with west side of Hart Memorial Hall and the two cupola ornaments on Vandeman Memorial Building, 260 feet (79 meters) from northwest corner of Hart Hall, about 650 feet (200 meters) southwest of main gate of university, 72.6 feet (22.14 meters) to pathway running diagonally across field to south, 81.6 feet (24.89 meters) to middle of pathway to east, and 172.6 feet (52.64 meters) to southeast corner of Education Building; marked by a red sandstone block 4 by 4 by 15 inches (10 by 10 by 38 centimeters) inscribed "U + U" (Union University), set with top face 4 inches (10 centimeters) below ground, the center of the cross indicating the exact spot. True bearings: top of cupola on Vandeman Building, 88° 25′.6; ornament on front gable of Education Building, 173° 00′.2; ornament on roof ridge of Administration Building, 218° 25′.4; northeast corner of Hart Hall at red coping stone, 329° 40′.0; northwest corner of Hart Memorial Hall, 359° 58′.6.

Station B was inside the walled city, about 0.50 mile (0.8 kilometer) north-northwest of center of city and about same distance east-southeast of the west gate, at the Mission Compound of the Society of Friends (known as "Friends' Center"), on Ching Lung Kai (Green Dragon Street), on open grassland to east of the two mission residences, and southwest of kindergarten building, 99.0 feet (30.20 meters) from south side of gate to kindergarten building, 79.1 feet (24.13 meters) from east wall of compound, 92.2 feet (28.12 meters) from prominent eucalyptus tree, 43.2 feet (13.18 meters) from inner junction of path to north, and 65.9 feet (20.10 meters) from inner junction of path to west; marked by a red

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sandstone block 2.5 by 7.5 by 18 inches (6 by 19 by 46 centimeters) set with top 1 inch (2.5 centimeters) below ground, a cross on top indicating the exact spot. True bearings: pointing on brick wall, 200 feet (60 meters), 1° 55′.8; bottom of prominent eucalyptus tree, 92.2 feet (28.12 meters), 18° 19′; tip of ornament on roof, 400 feet (120 meters), 29° 52′.6; bottom of brick wall at gate of kindergarten buildings, 99.0 feet (30.20 meters), 262° 40′.5; center of round ornament on end of roof of building, 304° 58′.3.

Fowchow, Szechwan, 1933.--About 400 meters southwest of CIW station of 1916, in residential compound of the Canadian Mission, on terrace between a pond and an ancient Chinese tomb, 46.5 feet (14.2 meters) from southwest corner of pond, and 67 feet (20.5 meters) to northeast corner of the tomb; marked by stone 5.5 by 5.5 by 14 inches (14 by 14 by 38 centimeters) set flush with ground, and lettered "CIW 1933." True bearings: ornament at southeast corner of Miss McIntosh's house, 350 meters, 186° 26′.0; left front corner of Stanway house, 400 meters, 210° 43′.5; left front corner of McAmmond house, 150 meters, 259° 05′.3; west end of roof of new Morgan house, 250 meters, 340° 43′.5.

Fulin, Szechwan, 1934.--About 0.25 mile (0.4 kilometer) north of Catholic Mission Church which was near center of the town, at the northeast end of a garden belonging to the Catholic Mission and situated on the Heo Kai (Back Street) at Kwan Ti K'an, 6 paces from the 12 foot (3.7 meter) high bank at northeast end of garden, 12 paces from bank at north end of garden, and 19 paces from corner of mud wall to west; not marked. No true bearings obtained. Magnetic bearings: lowest visible point of left edge of gray house, 150 feet (45 meters), 2° 28′; west end of roof ridge of house south of gray house, 200 feet (60 meters), 29° 18′; east end of roof ridge of house, 300 feet (90 meters), 42° 53′; center top of lowest peak of serrated range of mountains known as Pi Chia Shan, 10 miles (16 kilometers), 57° 59′.

Hankow, Hupeh, 1932, 1933.--Exact reoccupation of CIW station of 1916, on grounds of Hankow Race Club and Recreation Ground, in northwest part of field enclosed by race course, 32 paces from inside fence of inner dirt track (training track) measured toward the half-mile post, and 50 paces from the half-mile post; marked by a stone the visible part of which measured 8 by 8 by 8 inches (20 by 20 by 20 centimeters), embedded below ground in block of concrete, and lettered on top "CIW 1916 M. Sta." True bearings: half-mile post, 101° 09′.7;[a] right edge of International Export Building, 1 mile (1.6 kilometer), 327° 45′.6;[b] cupola on clubhouse, 0.33 mile (0.5 kilometer), 339° 59′.6;[b] top of tower on stables, 0.33 mile (0.5 kilometer), 359° 22′.5;[b] gable end on stables (almost under tower), 359° 22′.7.[c]

Hengchow, Hunan, 1935.--Exact reoccupation of CIW 1915 station, north of city of Hengchow, across the Tsao River, just outside north wall of the Presbyterian School (Kwang Teh School), on top of small hill northwest of Yang Sze Miao (Boatman's Temple); marked by stone 6.3 by 6.3 by 16 inches (16 by 16 by 41 centimeters), projecting 2 inches (5 centimeters) aboveground, and lettered "CIW 1935" with hole in center to indicate exact spot. True bearings: ornament on top of Presbyterian School, 2° 55′.6; cross on top of Catholic Church, 40° 10′.2; ornament of pagoda to northeast, 1000 feet (300 meters), 258° 10′.8.

Hwangnipu, Szechwan, 1934.--About 0.20 mile (0.3 kilometer) northeast of center of village, on west bank of the small river, opposite north end of village, about 20 paces north of a huge rock 20 feet (6 meters) high, 90 paces south of west end of small suspension bridge, 1.5 paces east of path along river, and 6 paces southwest of a large rock between path and river; not marked. Because of bad weather, solar observations were prevented; no bearings obtained.

Ichang, Hupeh, 1933, 1934.--Three stations were occupied. Station A was close reoccupation of CIW station of 1916, about midway along south edge of military aviation field to east of railway terminus, 600 feet (183 meters) to east of southeast corner of railway station, and 2 paces north of ditch on south side of field; not marked. True bearings: southeast corner of railway station, 600 feet (183 meters), 85° 59′.7; northeast corner of railway station, 100° 19′.8; west corner of long building to north of railway station, 0.50 mile (0.8 kilometer), 131° 01′.6; top of eaves ornament on near gable end of temple on hill, 0.50 mile (0.8 kilometer), 267° 33′.7; telegraph pole to south, 0.50 mile (0.8 kilometer), 343° 14′.7.

Station B was about 0.50 mile (0.8 kilometer) south of A, a close reoccupation of CIW station B of 1916, on grounds of Huntington School of the American Church Mission, at south edge of football field, just west of south goal posts, and west-southwest of school building, 9.3 feet (2.84 meters) from middle of path to south, 31.1 feet (9.49 meters) from nearest goal post, 38.1 feet (11.62 meters) from big tree behind goal, 89.8 feet (27.39 meters) from CIW station C, 146.4 feet (44.65 meters) from north corner of north pillar of well house, and 165.7 feet (50.54 meters) from southwest corner of school building; marked by a limestone post 4 by 6 by 26 inches (10 by 15 by 66 centimeters) set with top flush with ground surface, with a drill hole indicating exact spot. True bearings: top of west goal post at north end of field, 300 feet (90 meters), 167° 05′.4; south side of back door of school, 232° 16′.2; southwest corner of school building, 243° 31′.8; bottom of north corner of northernmost pillar of well house, 252° 14′.6.

Station C was 89.8 feet (27.39 meters) north by west from B, on grounds of Huntington School of the American Church Mission, nearly in middle of football field, and in line with north wall of chapel; marked by stone set flush with ground and lettered "CIW 1933." True bearings: west end of horizontal bar of goal at north end of field, 164° 32′.9; east end of same bar at point of intersection with east edge of vertical post, 170° 39′.2.

Ipin (Suifu), Szechwan, 1934.--Two stations were occupied. Station A was exact reoccupation of CIW station of 1916, about 1 mile (1.6 kilometer) southeast of center of city, on south bank of Yangtze River, on grounds of American Baptist Mission, in extreme east corner of recreation field just back of Munroe Academy, 4 paces west and 3 paces north of bottom of stony bank bounding field, 248 feet (75.64 meters) to south corner of wall around academy, 157.5 feet (48.04 meters) to east corner

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[a] 1933 value, since half-mile post was renewed between 1932 and 1933 occupations. [b] Mean of 1932 and 1933 values. [c] 1933 value. This bearing was not taken in 1932.

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of wall around academy, 16.25 feet (4.96 meters) to nearest (east) corner of sidelines of football field, and 71.95 feet (21.94 meters) to south goal post at east end of field; marked by stone block, 8 by 8 by 24 inches (20 by 20 by 61 centimeters), set with top surface just beneath sod, and inscribed "CIW 1916" with drill hole to indicate exact spot. True bearings: center ornament on south gate of city, 0.33 mile (0.5 kilometer), 109° 10′.0; center ornament on Drum Tower in city, 0.50 mile (0.8 kilometer), 115° 20′.2; top west end of roof ridge of Munroe Academy, 400 feet (120 meters), 128° 31′.6; east corner of wall of Munroe Academy (at the foundation stone), 157.5 feet (48.04 meters), 153° 43′.1.

Station B, a secondary station, was about 1.5 mile (2.4 kilometers) northwest of A, on residence compound of American Baptist Mission, about 0.25 mile (0.4 kilometers) northeast of north gate of city, in southwest corner of residence compound, on grass plot used as recreation ground, exactly in line with west edge of veranda posts of mission residence to north and with south line of veranda posts of residence to east, 2.2 feet (0.67 meter) north of line joining two stone markers for tennis posts, 20.65 feet (6.30 meters) from center of east stone tennis-post marker, 22.25 feet (6.79 meters) from center of west stone tennis-post marker, 52.6 feet (16.04 meters) from low wall on north side of recreation ground, 74.9 feet (22.84 meters) from low wall on east side of recreation ground, 62.7 feet (19.12 meters) from west end of low wall to southeast, and 64.6 feet (19.70 meters) from end of wall to northwest; marked by a column of bricks, 0.65 by 0.9 by 0.7 foot deep (20 by 27 by 21 centimeters), set with top surface just below sod, center of top indicating exact spot. No true bearings because of bad weather. Magnetic bearings: top corner of south wall around residence to north, 64.6 feet (19.70 meters), 120° 20′.7; west line of veranda posts of residence to north, 150 feet (45 meters), 155° 47′.1; south line of veranda posts of residence to east, 150 feet (45 meters), 245° 35′.7; cupola on hospital building, 800 feet (240 meters), 303° 01′.3; west edge of stone coping on brick pillar at end of wall, 62.7 feet (19.12 meters), 310° 11′.4.

Kalgan, Hopei, 1932.--Two stations were occupied. Station A was close reoccupation of CIW station of 1922, in compound of former mission of Russian Greek Church, now in ruins, about 1 mile (1.6 kilometer) beyond north gate of city, on south side of main road forming pass into Mongolia, 1.5 feet (0.47 meters) south of the 1922 station at a point in line with main east edge of stone platform marking former site of chapel, and 31.6 feet (9.64 meters) north of northeast corner of chapel; marked by a triangular brick 8 by 8 by 8 inches (20 by 20 by 20 centimeters) set with apex just beneath surface of ground. True bearings: pointed rock on hill, 1 mile (1.6 kilometer), 213° 41′.2; near end of roof of gray brick house in valley, 1000 feet (300 meters), 252° 12′.5; chimney on flat roof of mud house under cliff to east, 0.25 mile (0.4 kilometer), 272° 50′.6; bottom of northeast corner of ruined chapel, 355° 40′.8.

Station B was on western outskirts of town, about 1 mile (1.6 kilometer) west of railroad station, in center compound of American Protestant Mission, on grassland at south end of walled enclosure to south of superintendent's residence, 215.0 feet (65.58 meters) from south corner of residence, 130.2 feet (39.71 meters) from southwest corner of compound wall, and 48.3 feet (14.73 meters) from wall to west; marked by a rough boulder 7 by 9 by 24 inches (18 by 23 by 61 centimeters) with circular hole in top to indicate exact spot, and buried just below surface of ground. True bearings: grave pillar on skyline, 1 mile (1.6 kilometer), 3° 44′.9; tower on hill to west, 1 mile (1.6 kilometer), 91° 20′.6; tower on hill to north, 2 miles (3 kilometers), 191° 24′.7; east corner of residence, about 300 feet (90 meters), 205° 05′.7; cupola of mosque, about 500 feet (150 meters), 313° 31′.8; cupola of mosque, about 1500 feet (460 meters), 338° 09′.9.

Kangting, Sikang, 1934.--Two stations were occupied. Station A was about 0.20 mile (0.3 kilometer) west of center of town, at compound of China Inland Mission, in Foreign Children's Cemetery which occupied the level strip of land in west corner of compound, 4.55 feet (1.39 meters) from foot of east wall of cemetery, 13.60 feet (4.15 meters) from southeast corner of granite slab holding tombstone of James Marquis Peterson, 28.2 feet (8.60 meters) from northeast corner of cemetery, and 32.9 feet (10.03 meters) from southeast corner of cemetery; marked by a granite block 8 by 8 by 8 inches (20 by 20 by 20 centimeters) set with top face flush with ground and lettered "CIM 1934" with drill hole in center to indicate exact spot. Note that this is CIM instead of CIW in deference to wishes of the Rev. Mr. Cunningham in charge of the mission station. True bearings: southeast corner of cemetery, 32.9 feet (10.03 meters), 21° 04′; center ornament on rear building of Sacred Edict Temple, 0.50 mile (0.8 kilometer), 268° 58′.6; bottom of cross on Roman Catholic Cathedral, 800 feet (250 meters), 272° 07′.0; left edge of northernmost chimney of residence of China Inland Mission, 200 feet (60 meters), 274° 57′.1; center ornament on rear building of post office, 0.33 mile (0.5 kilometer), 305° 35′.1.

Station B was about 0.50 mile south of A, at south end of town, on property of Mission Étranger de Paris, about 300 feet (90 meters) outside the south gate of the city, on narrow shelf of level ground between southeast wall of mission compound and steep wooded mountain slope rising to south of it, at southwest end of level shelf and south of large garden containing the Seminary and Press buildings, 23.15 feet (7.06 meters) from nearest point of southeast wall of compound, 24.5 feet (7.47 meters) from nearby corner of southeast wall of compound, 76.5 feet (23.33 meters) from east side of gate into hospital compound, and 131 feet (40 meters) from southeast corner of wall of mission compound; marked by a rough block of quartzite about 6 by 12 by 24 inches (15 by 30 by 60 centimeters), projecting 6 inches (15 centimeters) aboveground, with top dressed to 3 by 6 inches (8 by 15 centimeters) and lettered "CIW," a small hole in middle of letter I indicating exact spot. True bearings: center of central roof ornament on hospital ward building, about 200 feet (60 meters), 72° 31′.9; center of roof ornament on printing press building, about 260 feet (80 meters), 146° 06′.5; deep cleft in distant mountain range, 10 miles (16 kilometers), 177° 56′.1; top of pear-shaped ornament on center of Lawasery roof in city, 0.50 mile (0.8 kilometer), 182° 27′.6; south end of roof of China Inland Mission residence (near station A), 0.50 mile (0.8 kilometer), 181° 46′.2; east end of roof

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ridge of south gate of city, 600 feet (180 meters), 195° 14′.8; southeast corner of wall of mission compound, 131 feet (39.96 meters), 223° 16′, approximately.

Kweichowfu, Szechwan, 1933.--Two stations were occupied. Station A was about 20 meters south of CIW 1916 station, on south bank of Yangtse River, directly opposite Big South Gate of city, on alluvial slope just north of field belonging to the Wei Family, angle at station between southeast and southwest corners of city wall was 47° 14′.0; not marked. True bearings: left end of roof of Big South Gate tower, 183° 17′.6; east end of tall wall of China Inland Mission, 196° 09′.5; ornament on Confucian temple, 208° 10′.1; top of pagoda on north bank of river, 242° 20′.3; top of pagoda on hilltop, 303° 55′.7.

Station B was about 0.8 kilometer north of A, within the city, in China Inland Mission compound, on school playground just north of church, 53.2 feet (16.2 meters) from south wall of playground, 22.0 feet (6.7 meters) from north wall, and 58.1 feet (17.7 meters) from Chinese pastor's house; marked by stone post 6 by 6 by 15 inches (15 by 15 by 38 centimeters) set flush with ground and lettered “CIW 1933.” True bearings: north end of classroom roof, 68° 24′.5; ornament at north end of church roof, 340° 41′.6.

Kweilin, Kwangsi, 1935.-- Close reoccupation of CIW station of 1907, about 80 feet (24 meters) southeast of old station, on lawn in rear of Church Missionary Society's hospital compound which was near north gate of city, 10.6 meters from northwest corner of Dr. Bacon's house, 14.26 meters from house to east, and 9.74 meters from north wall; marked by stone 5.75 by 5.75 by 17.5 inches (15 by 15 by 44 centimeters) projecting 2 inches (5 centimeters) aboveground and inscribed “CIW 1935” with cross in center to indicate exact spot. True bearings: cross on wall of small cabin to southwest, 35° 02′.9; northeast corner of Dr. Bacon's house near roof, 313° 48′.3.

Loshan (Kiatingfu), Szechwan, 1934.-- Two stations were occupied. Station A was close reoccupation of CIW station of 1916, on premises of Canadian Methodist Mission on the main street just inside west gate of city, near southeast corner of tennis court, about 200 feet (60 meters) south of residence of Rev. Mr. Quentin, in line with south line of court, 11.79 feet (3.60 meters) from its southeast corner, 8.6 feet (2.62 meters) from wall to east, and 39.7 feet (12.11 meters) from east post at center of tennis court; marked by a red sandstone block, 7 by 10 by 18 inches (18 by 25 by 46 centimeters), set flush with ground surface, inscribed “CIW 1934,” with drill hole in center to indicate exact spot. True bearings: black brick in wall of compound, 100 feet (30 meters), 132° 33′.4; bottom of east tennis post, 39.7 feet (12.11 meters), 175° 54′.2; southwest corner of mission residence at roof level, 200 feet (60 meters), 181° 04′.1; northeast corner of mission residence at second floor, 200 feet (60 meters), 200° 36′.3.

Station B, a secondary station, was about 0.25 mile (0.4 kilometer) west of A, just northwest of west gate of city, on low grassy bank at extreme west end of hospital compound of the Canadian Mission, 70.7 feet (21.56 meters) from south edge of gun embrasure in city wall; 79.5 feet (24.25 meters) from edge of transverse wall joining city wall to south; marked by a red sandstone block, octagonal with circular top 1 foot (30.5 centimeters) in diameter, projecting 5 inches (13 centimeters) aboveground, lettered “CIW 1934,” with drill hole in center to indicate exact spot. No true bearings obtained because of bad weather. Magnetic bearings: top of south edge of gun embrasure in city wall, 70.7 feet (21.56 meters), 34° 19′; ornament on north gable on east side of Mission School for Boys, 0.25 mile (0.4 kilometer), 84° 17′; west end of roof ridge of main hospital building, 400 feet (120 meters), 247° 10′; center ornament on roof of temple, 500 feet (150 meters), 323° 47′; top edge of transverse wall at junction with city wall, 334° 42′; ornament on distant tower, 2 miles (3 kilometers), 344° 14′.

Lukiapang, Kiangsu, 1931.--Intercomparison observations were made at the observatory on the same piers as in 1911 and 1917. Piers D_a and D_b were the magnetometer and dip-circle piers, respectively, in the absolute house. Pier F, “Edmunds pillar,” was outside, about 18 meters southwest of the magnetometer pier.

Luting, Szechwan, 1934.--At the Catholic Mission Compound, on right bank of T'ung River, about 0.67 mile (1 kilometer) southwest of center of town, in vegetable garden in extreme southwest corner of the mission compound, 43.0 feet (13.12 meters) from southwest corner of compound wall, 32.0 feet (9.76 meters) from bottom of outer wall to west, and 21.1 feet (6.44 meters) from south wall of compound; marked by large block of stone buried so that its top is a ridge 8 inches (20 centimeters) long projecting 2 inches (5 centimeters) aboveground, a notch cut in the middle of the ridge indicating the exact spot. No true bearings were taken owing to overcast weather. Approximate magnetic bearings: top of mountain ridge, 3 miles (5 kilometers), 0° 39′; southwest corner of mission-compound wall, 43.0 feet (13.12 meters), 24° 03′; bottom of cross on front of church, about 220 feet (67 meters), 217° 51′; black upright post at front of white-gabled house, 0.25 mile (0.4 kilometer), 252° 28′.

Mosimien, Sikang, 1934.-- At the Leprosarium of the Mission Étranger de Paris, about 2 miles (3 kilometers) north of village of Mosimien, on main road to Tatsienlu, in large garden near east wall of Leprosarium, exactly in line with main facade in front of church, and 42.55 feet (12.98 meters) from east wall of compound; marked by stone block 0.95 by 0.95 by 1.1 feet (29 by 29 by 34 centimeters), projecting 1 inch (2.5 centimeters) aboveground, and inscribed “CIW 1934,” a drill hole in center of top indicating exact spot. True bearings: bottom of cross on front of church, 500 feet (150 meters), 56° 02′.4; bottom of northeast corner of brick wall of leper hospital, 150 paces, 95° 33′.6; top of wooden spike of nearest leper dormitory, 250 feet (75 meters), 164° 31′.6.

Nanning, Kwangsi, 1935.-- Proximate reoccupation of CIW 1917 station, outside city, about 4 kilometers northeast of 1917 station, on piece of flat land about 400 meters north of main building of the Bureau of Animal Industry, 35 meters from nearest point of pond to east, and 39 meters from nearest point of pond to south; marked by stone 5 by 5 by 24 inches (13 by 13 by 62 centimeters) projecting 2 inches (5 centimeters) aboveground, and inscribed “1935” with four Chinese characters meaning Nanning Magnetic Station and a small cross cut in top of stone. True bearings: right-hand wireless tower, 28° 11′.8; pagoda to south, 321° 31′.4; northwest edge of water tower of Bureau of Animal Industry, 336° 55′.0.

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Nitow, Szechwan, 1934.--About 0.33 mile (0.5 kilometer) west of center of town, in graveyard on hillside, reached by following small track leading northwest from stone bridge at extreme west end of town, 220 paces up the hillside along this path which followed a stream bed, on flat grassland, near southeast side of cemetery, about 100 yards (90 meters) northwest of main road between Yachow and Tatsienlu, 42 paces south of footpath from bridge, 27 paces northeast of footpath at base of rocky hill, 37.15 feet (11.33 meters) from nearest tombstone to west, 24.5 feet (7.47 meters) from base of nearby tree to south, and 63.1 feet (19.25 meters) from tombstone surmounted with the characters "WAN KU KWEI;" marked by tent peg driven flush with ground surface. Owing to continued overcast weather no true bearings were obtained. Magnetic bearings (approximate): top of top character on nearest tomb to west, 37.15 feet (11.33 meters), 118° 10′; north edge of tombstone with the Chinese characters "WAN KU KWEI," 63.1 feet (19.25 meters), 163° 11′; front gable of farmhouse, 0.25 mile (0.4 kilometer), 232° 50′; prominent tree on hillside, 0.25 mile (0.4 kilometer), 268° 40′; center of top of distant peak, 10 miles (16 kilometers), 307° 46′.

Omei, Szechwan, 1934.--Near center of city at Hsien Li Hsiao Hsioh Hsiao (District Primary School) which was just west of the Magistrate's Yamen, at junction of road from south gate of city with main road joining the east and west gates, near west end of football ground of Primary School, exactly in line with west end of classroom building bounding football ground on north, 52.85 feet (16.12 meters) from southwest corner of classroom building, 54.6 feet (16.65 meters) from wall bounding football ground on south measured along projection of west side of classroom building, and 21 paces from a very large banyan tree on school playground; not marked. No bearings because of bad weather.

Pahsien (Chungking), Szechwan, 1933, 1934.-- Two stations were occupied. Station A was exact reoccupation of CIW station of 1933 (Chungking, B), about 2.33 miles (2.75 kilometers) northeast of center of old walled city of Chungking, on front lawn of Chungking Junior Middle School of the Canadian Mission, between basketball field and duck pond, 37 feet (11.3 meters) from path to school on west, 24.6 feet (7.5 meters) from foot of bank bounding basketball field on north, and 34.0 feet (10.37 meters) from stone path alongside duck pond to south; marked by a stone post measuring 5.75 by 5.75 inches (14.6 by 14.6 centimeters) on top, set with top flush with ground, lettered "CIW 1933" with drill hole in center to indicate exact point. True bearings: left side of wall around mission-residence compound to south, 0.25 mile (0.4 kilometer), 17° 28′.9; right corner of Rackham's house, 0.3 mile (0.45 kilometer), 34° 18′.9.

Station B, a secondary station, was about 2 miles (3 kilometers) west-northwest of center of old walled city of Chungking, about 3 miles (4.8 kilometers) west-southwest of A, on compound of Methodist Episcopal Middle School at Tseng Chia Ngai (Tseng Family Cliff), in extreme west corner of compound of Chu Chin Middle School, overlooking the Kialing River, west of mission residence No. 2 which was in highest part of campus, about 1200 feet (360 meters) west of football field, 107.7 feet (32.85 meters) from foundation stone at west corner of house, and 149.8 feet (45.69 meters) from north pillar of house No. 2; marked by sandstone block 11.4 by 11.4 by 9.0 inches (29 by 29 by 23 centimeters) set level with surface of ground and inscribed "CIW 1934" with drill hole in center to indicate exact spot. No true bearings were determined because of bad weather. Magnetic bearings: top of tower of military barracks on hill, 1 mile (1.6 kilometer), 43° 39′; outer edge of north pillar of house, 149.8 feet (45.69 meters), 245° 23′; west pillar of house at foundation stone, 107.7 feet (32.85 meters), 255° 22′; east corner of wall of Pa Chung Middle School compound, 0.50 mile (0.8 kilometer), 322° 02′.

Peiping, Hopei, 1932.-- Three stations were occupied. Station A was exact reoccupation of CIW station of 1922, on grounds of Russian Ecclesiastical Mission, 36.1 feet (11.01 meters) west of southwest corner of ruins of abandoned tower which formerly carried the sunshine recorder; marked by stone 7.5 by 7.5 by 27 inches (19 by 19 by 69 centimeters) projecting 3 inches (8 centimeters) aboveground and inscribed "CIW: OCP 1922," and also bearing name of Observatoire Centrale de Pekin in Chinese characters. True bearings: left end of roof of mission building seen through trees, about 400 feet (120 meters), 26° 54′.9; near gable of small house, 80 feet (24 meters), 96° 47′.1; right gable of small building, 400 feet (120 meters), 160° 57′.9; left one of two tall smokestacks seen through trees, 800 feet (240 meters), 204° 08′.1; right ornament on gray house, 800 feet (240 meters), 208° 49′.1.

Station B was close reoccupation of CIW stations of 1916 and 1922, in former public park (now sold for building sites), about 0.25 mile (0.4 kilometer) northwest of north gate of Temple of Agriculture enclosure, 62 paces from northwest corner of dwelling houses to east, 60 paces from southwest corner of same, 54 paces north of old cart road across park, and 12 paces east of footpath running diagonally across park; not marked. True bearings: bottom of smokestack, 0.33 mile (0.5 kilometer), 216° 47′.4; left spire of cathedral in Legation Quarter, 2 miles (3 kilometers), 217° 08′.7; northwest corner of nearby houses, 62 paces, 250° 35′.1; southwest corner of same, 285° 31′.8; right ornament on Temple of Agriculture, 0.25 mile (0.4 kilometer), 339° 37′.3.

Station C was at Tsing Hua University about 6 miles (9.6 kilometers) west of northwest corner of city wall of Peiping, in center of university athletic field, 275 feet (84 meters) south of chemical laboratory, 272 feet (83 meters) west of gymnasium, 400 feet (122 meters) north of biological laboratory, and about 300 feet (90 meters) east of meteorology tower; marked by stone about 5 inches (13 centimeters) square at top, set flush with ground, and lettered "CIW 1932." True bearings: right edge of biological laboratory, 11° 04′.2; left edge of gymnasium roof, 250° 20′.8; left lower corner of biological laboratory entrance, 358° 51′.4.

Shasi, Hupeh, 1933.-- Two stations were occupied. Station A was practical reoccupation of CIW station of 1916, about 400 feet (120 meters) north-northwest of probable former site, on north side of Customs Compound, opposite Japanese Consulate, exactly in line with west side of consulate outbuilding and north side of outbuilding behind customs-staff residence on east side of compound, 29 paces from north wall of Customs Compound, and 92 paces west of fence around customs-staff residence; not marked. True bearings: top of ball ornament on west pillar of gate, about 350 feet (100 meters), 24° 51′.9; top

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southeast corner of cotton-packing plant, 0.25 mile (0.4 kilometer), 119° 49′.6; northeast corner of mission residence, 350 feet (100 meters), 163° 13′.0; top of paling at southwest corner of fence around customs-staff residence, about 250 feet (75 meters), 331° 33′.5.

Station B was about 400 feet (120 meters) north-northwest of A, in compound of Lutheran Mission, just west of Japanese Consulate, in northeast corner of mission compound on land reserved for cemetery, exactly in line with east side of missionary residence, 18.8 feet (5.73 meters) from wall to north, 26.9 feet (8.20 meters) from wall to east, and 91.7 feet (27.97 meters) from northeast corner of servants' quarters of residence; marked by a granite stone 5.4 by 10.8 by 48 inches (14 by 28 by 122 centimeters) projecting 15 inches (38 centimeters) aboveground with drill hole in top to indicate exact spot and lettered "CIW" on south face. True bearings: northeast corner of servants' quarters of residence, 31° 48′.3; northwest corner of same, 51° 07′.2; top southeast corner of cotton-packing plant, 0.25 mile (0.4 kilometer), 92° 06′.9; roof ornament of building on dyke, 0.25 mile (0.4 kilometer), 243° 24′.2; top corner of compound wall to northeast, about 30 feet (9 meters), approximately 260° 16′.

Shenchow, Honan, 1932.--Two stations were occupied. Station A was probably an exact reoccupation of CIW station of 1909, about 0.12 mile (0.2 kilometer) south of southeast corner of city, on cultivated ground which in 1909 was the yard of a small temple (now in ruins), 30 feet (9.15 meters) from mud wall to southwest, and 22.5 feet (6.86 meters) from remains of mud wall to northwest; not marked. True bearings: east end of roof of inner tower above Sun Yat Sen Gate, about 0.50 mile (0.8 kilometer), 109° 11′.1; middle corner of pagoda just above city wall, 0.25 mile (0.4 kilometer), 146° 38′.5; southeast corner of city wall at highest point, 0.12 mile (0.2 kilometer), 185° 52′.5.

Station B was about 1 mile (1.6 kilometer) northwest of A, in back yard of Swedish Mission Compound situated nearly in heart of city, 106.5 feet (32.48 meters) from north wall next to road, 41.5 feet (12.66 meters) from east wall, and 29.0 feet (8.84 meters) from west wall; marked by stone 6 by 6 inches (15 by 15 centimeters) on top, projecting 2.5 inches (6 centimeters) aboveground, and inscribed "CIW 1932." True bearings: near end of roof of nearest building just outside of west wall, 73° 58′; left edge of trunk of tallest tree just outside and above north mud wall, 201° 05′.9; left edge of wall of upper part of tower of Education Bureau (old Confucian Temple) just above terrace, 330° 28′.3; yellow ornament on roof of temple behind tower of Education Bureau, 343° 23′.7; left ornament on roof of nearest building to south, 352° 57′.0.

Shihkiachwang, Hopei, 1932.--Two stations were occupied. Station A was about 0.25 mile (0.4 kilometer) northwest of railroad station, in front yard of the British-American Tobacco Company, northeast of round flower bed in front of residence occupied by foreign agent; marked by a stone 5.5 inches (14 centimeters) square at top, projecting slightly aboveground, and lettered "CIW 1932." True bearings: southwest corner of low building to north, 201° 56′.9; bottom of northeast corner of residence, 344° 07′.6; left edge of flat stone slab of first window of main residence to south counting from east side, 359° 08′.1.

Station B was about 1 mile (1.6 kilometer) west of A, on western outskirts of town, about 0.75 mile (1.2 kilometer) west of railroad station, in middle of path of vegetable garden at south end of compound of Danish Mission Station, 116 paces south of church, and 13 paces north of south wall of compound; marked by wooden peg driven flush with surface of ground. True bearings: southwest corner of outhouse, 50 paces, 160° 17′.5; southwest corner of church, 116 paces, 173° 23′.1; southeast corner of church, 116 paces, 179° 17′.6; extreme southwest corner brickwork of southeast pillar of compound wall, about 80 feet (25 meters), 300° 24′.1.

Shinchow, Kwangtung, 1935.--Close reoccupation of CIW 1911 and 1915 stations, in hospital compound of English Methodist Mission, on lawn at south end of compound, in line with west side of a two-story double house, 24.41 meters from the southwest corner of same house, and 32.10 meters from south edge of door in west wall; not marked. True bearings: top of gable of bungalow to west of double house, 131° 03′.8; southwest corner of double house, 163° 51′.7; southeast corner of double house, 214° 36′.1.

Sian, Shensi, 1932.--Two stations were occupied. Station A was exact reoccupation of CIW station of 1909, just outside west gate of city, in Swedish Mission Compound, on school playground, on west side of path leading from gate to school building, 92.8 feet (28.29 meters) from northwest corner of school building, 25 feet (7.6 meters) from mud wall on west side of compound, 40 feet (12.2 meters) from southeast corner of gatekeeper's house, and 36.5 feet (11.13 meters) from entrance at main gate; marked by a hole in top of grayish-black stone 4 by 7 by 36 inches (10 by 18 by 91 centimeters) set flush with surface of ground and lettered "CI 1909." True bearings: bottom of northwest corner of schoolhouse, 6° 31′.7; right edge of mission residence (at point where it meets wall of school compound), 42° 05′.3; near corner of gatekeeper's house, 155° 08′.1; bottom of northeast corner of schoolhouse about 1 foot (0.3 meter) aboveground, 332° 37′.9.

Station B was about 3.5 miles (5.6 kilometers) due east of A, about 0.50 mile (0.8 kilometer) west of main east gate of city, on hospital compound of English Baptist Mission, at west end of large unused garden in southwest corner of compound, 30.6 feet (9.33 meters) from north wall of garden, 33.6 feet (10.25 meters) from brick incinerator, and 65.7 feet (20.04 meters) from northwest corner of garden; marked by stone 7 by 7 by 18 inches (18 by 18 by 46 centimeters), projecting 2 inches (5 centimeters) aboveground, and lettered "CIW 1932," with hole in center to indicate exact spot. True bearings: near end of ornament on roof of nearby house, about 65 feet (20 meters), 45° 24′.7; northwest corner of garden wall, 65.7 feet (20.04 meters), 118° 39′; top of ornament on hospital, about 200 feet (60 meters), 227° 56′.0; near ornament on Temple of Hell, 0.25 mile (0.4 kilometer), 263° 43′.7; north end of roof of northernmost city gate, 0.50 mile (0.8 kilometer), 275° 48′.5; near corner of incinerator, 33.6 feet (10.25 meters), 311° 36′, approximately.

Taiyuanfu, Shansi, 1932.--Practical reoccupation of CIW station of 1907, about 135 feet (41 meters) from 1907 station, in back yard of provincial hospital of

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Shansi, 78.5 feet (23.94 meters) from nearest wall to east, 75.6 feet (23.06 meters) from the south wall, and 170 feet (51.8 meters) from the west wall; marked by stone, projecting about 4 inches (10 centimeters) aboveground, and lettered "CIW 1932." True bearings: top of left edge of gate to southwest of yard, 27° 54′.2; northeast corner of two-story building to northwest, 150° 44′.2; west side of ornament on east end of roof of Confucian Temple, 236° 13′.8; gable of nearest one-story building to southeast, 307° 50′.9.

Tawei, Szechwan, 1934.--About 0.33 mile (0.5 kilometer) south of the town, on waste land on north bank of a small river known as Heo Chi Ho, near small wooden bridge where river was crossed by main road from Omei Hsien, exactly in line with south wall of a vegetable garden on west side of road from village, and 23 paces from southeast corner of garden wall; marked by a drill hole in top of a large rock of which a portion, 12 by 20 inches (30 by 51 centimeters), was left exposed above surface of ground. No true bearings obtained. Magnetic bearings: stump of tree across river, 1000 feet (300 meters), 285° 58′.5.

Tienchen, Shansi, 1932.--Practical reoccupation of CIW station of 1916, outside city, about 0.25 mile (0.4 kilometer) northwest of north gate, near point where cart road from city gate reached east bank of wide sandy river bed, 11 paces from riverbank, and 17 paces from middle of cart road; not marked. No azimuth observations were possible owing to steady rain. Magnetic bearings: northwest corner of city wall, 0.25 mile (0.4 kilometer), 48° 47′.5; first telegraph pole to west of northwest corner of city wall, 1 mile (1.6 kilometer), 51° 05′.8; center ornament on temple across river, 0.50 mile (0.8 kilometer, 206° 46′.1; northeast corner of city wall, 0.75 mile (1.2 kilometer), 291° 22′.5.

Tinghsien (Tingchowfu), Hopei, 1932.--Near northwest corner of yard to west of Mass Education Hospital, 34 feet (10.4 meters) from north wall, and 58 feet (17.7 meters) from west wall; marked by stone post 6.5 inches (16.5 centimeters) square on top and lettered "CIW 1932." True bearings: top of ornament on pagoda to southwest, 68° 01′.2; top of flagmast at end of tip, 116° 00′.1; top of ornament on hospital pavilion, 277° 08′.7; right edge of hospital just above wall, 298° 36′.7.

Tzetati, Sikang, 1934.--About 0.75 mile (1.2 kilometer) west-northwest of village of Tzetati, on left (north) bank of mountain river which flowed into the T'ung River just north of the village, on rocky waste land of old river bed, along main path between suspension bridge and millrace to the north, 121 paces from suspension bridge and 86 paces from millrace, then 22 paces east of this point of the path; not marked. True bearings: northwest corner of masonry wall at approach to suspension bridge, 105 paces, 6° 19′.2; distant gap in valley to west, 5 miles (8 kilometers), 50° 44′.4; center of south window of farmhouse, 200 feet (60 meters), 122° 22′.6; prominent tall tree, 0.50 mile (0.8 kilometer), 273° 08′.1.

Wanhsien, Szechwan, 1933.--Proximate reoccupation of CIW 1916 station, on opposite side of Yangtze River, in West Hill City Park, just southeast of West Hill Stone Terrace, on a lower level, 29.2 feet (8.9 meters) from curved stone terrace, and 97 feet (29.6 meters) from nearest edge of pavilion just below the level to southeast; marked by stone 6.25 by 6.25 by 20 inches (16 by 16 by 51 centimeters) projecting 3 inches (8 centimeters) aboveground. True bearings: flagpole on clock tower, 240° 00′.4; top of straw-covered pavilion, 317° 59′.6.

Wuchang, Hupeh, 1931-1936.--On campus of Central China College in the extreme southwest corner of the Boone Compound of the American Church Mission, south of tennis courts for college faculty, in exact line with west wall of servants' quarters of double residence to the south, 114.33 feet (34.87 meters) from northwest corner of president's house, 92.42 feet (28.19 meters) from southwest corner of president's house, 96.67 feet (29.48 meters) from northwest corner of servants' quarters of double residence to the south, 105.42 feet (32.15 meters) from southeast corner of Wesleyan House, and 85.17 feet (25.98 meters) from southeast corner of big red house; marked by a granite stone 8 by 8 by 16 inches (20 by 20 by 40 centimeters) set with top face at ground level and inscribed "CIW 1932" with drill hole in center to indicate exact spot. True bearings: northwest corner of servants' quarters, 7° 33′.2; southeast corner of Wesleyan House, 84° 37′.3; southeast corner of large red house, 174° 41′.3; left edge of Yen Hostel, 189° 35′.6; right gable of Yen Hostel, 205° 54′.5; bottom of cross on administration building, 231° 32′.4; northwest edge of president's house, 254° 16′.1; southwest corner of president's house, 286° 33′.7; cross on wall of Kwei servants' quarters, 357° 33′.1.

Wuchow, Kwangsi, 1935.--Close reoccupation of CIW 1917 station, on lawn to east of Botanical Research Institute of Kwangsi University, on top of hill overlooking junction of Fu and West Rivers, 8.8 feet (2.7 meters) west of 1917 station, 9.1 feet (2.77 meters) from nearest fir tree to south; marked by stone post 4.5 by 4.6 by 19 inches (11 by 12 by 48 centimeters) projecting 2 inches (5 centimeters) aboveground and inscribed "1935" with four Chinese characters meaning Wuchow Magnetic Station and a small circle cut in top of stone. True bearings: lower southeast corner of Botanical Research Institute building, 35.05 meters, 79° 12′.2; upper northeast corner of Botanical Research Institute building, 103° 38′.7; southeast corner of brick pillar to north, 161° 24′.0.

Yaan (Yachowfu), Szechwan, 1934.--Close reoccupation of CIW station of 1916, about 0.25 mile (0.4 kilometer) south of center of city, at foot of Ch'ang Pin Shan (Long Level Hill) which bound commerical and residential sections of city on the south, south of the Meng property of the American Baptist Mission, on small level shelf of land, 2.5 paces to edge of steep bank to south, 5 paces to bottom of steep bank to north, 26 feet (8 meters) to stone path running diagonally up hillside to south, and 88.4 feet (26.96 meters) to southeast corner of wall of mission property; marked by a cross cut in top of large red sandstone block about 3 feet (1 meter) square protruding from hillside, this cross being 9.6 inches (24 centimeters) from west edge of rock and 2.3 feet (70 centimeters) from a deep notch cut in its north edge. True bearings: top southwest corner of wall of mission residence, about 120 feet (35 meters), 126° 29′.6; top southeast corner of same, 88.4 feet (26.96 meters), 143° 45′.4; east edge of easternmost chimney of mission residence, 169° 41′.7; pagoda on ridge to north, 1 mile (1.6 kilometer), 188° 06′.0.

Yinkwanchai, Sikang, 1934.--About 1 mile (1.6 kilometer) east of the village, up the river valley, in south

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corner of a camping ground for caravans, about 200 feet (60 meters) southeast of a Tibetan "chorten" (religious monument) which dominated the camping ground, 8 paces from low stone wall around a cultivated field adjoining camping ground on the southwest, 11 paces to east corner of low wall around field, and 27 paces to main caravan route to the southeast; not marked. True bearings: "obo" (pile of rocks) on hilltop, 4 miles (6 kilometers), 10° 55'.4; top of "chorten," about 200 feet (60 meters), 107° 47'.4; west edge of Tibetan house, about 250 feet (75 kilometers), 164° 01'.0; center of top window in tower of house, 0.33 mile (0.5 kilometer), 219° 03'.0; "obo" on hilltop, 2 miles (3 kilometers), 249° 45'.6.

Yochow, Hunan, 1933.--Exact reoccupation of CIW station of 1916, at the port of Yochow, at the customs-station of Chenglingchi, near signal pole north of Commissioner's residence, and 65 paces northeast of flagpole; marked by an undressed granite slab 3 by 8 by 48 inches (7 by 20 by 122 centimeters) which can be identified by a circular hole and the Chinese character "KUAN" painted on one side. True bearings: west edge of northernmost chimney of Commissioner's residence, 600 feet (180 meters), 4° 38'.4; flagstaff and signal post, 65 paces, 10° 46'.4; top of pagoda, 2.5 miles (4 kilometers), 28° 17'.2; west gable of Standard Oil reserve, 0.50 mile (0.8 kilometer), 225° 16'.0.

Zosè Observatory, 1933.--Observations were made at the new observatory located at Zosè Hill about 19 miles (30 kilometers) southwest of Shanghai. Intercomparisons with the observatory standard instruments were made at three points in the magnetic observing huts, namely, the northeast pier in the large hut, the northeast (or Smith) pier in the small hut, and the northwest (or Schulze) pier in the small hut, and also at a fourth (outside) pier near the small hut and known as the "Brown Pillar."

India

Benares, 1928.--In the southwest part of the city, on the cantonment parade ground, 170 meters east of the main road from Allahabad, 40 meters due west of a well, and 100 meters northeast of a second well near the main road from Allahabad; not marked. True bearing: a railroad signal tower to the south, 338° 02'.1.

Channu, Multan, 1928.--Northeast of the city of Multan, about 118 kilometers by road from the city, the nearest village being Channu. The station was on the level ground 30 meters from the left canal bank, the canal being the main line of the Multan-Lahore canal system; not marked. True bearing: nearest corner of masonry work on small bridge, 268° 59'.4.

Delhi, 1928.--Inside the northern city limit, on the bank of River Jumna, about 120 meters above the ruins of an old fort, and near a building belonging to the race club which was nearby on a hill to the northwest; marked by a peg. True bearing: a radio mast to the east by the railroad bridge, 337° 05'.2.

Lahore, 1928.--On a small uncultivated plain 45 kilometers east of the city of Lahore as measured by the motor-car meter along the Grand Trunk Road, approximately 100 meters north of the road; not marked. True bearing: a telegraph pole visible through the woods to the south, 11° 59'.9.

Indo-China

Hanoi, Tonkin, 1938.--The 1911 station could not be reoccupied because it was built over by government offices and private dwellings. The new station was at the southern end of the racecourse at Bagatelle about 2 miles (3 kilometers) southwest of "The Residence," 29.8 feet (9.08 meters) south of nearest point of outer fence of race track, 38.0 feet (11.58 meters) east of the eighth tee (men), and 19.5 feet (5.94 meters) north of center point of a steep embankment between the racecourse and a canal. True bearings: near gable end of brick stable, 31° 43'.9; base of flagpole on cafe on racecourse, 150° 52'.3; extreme top of right corner of building visible over grandstand, 164° 55'.7; lightning rod on tall brewery chimney, 253° 51'.3; right-hand edge of cross on gate of monastery, 303° 54'.3.

Hué, Annam, 1938.--The station of 1911 could not be reoccupied owing to the encroachment of buildings. The new station was about 0.33 mile (0.54 kilometer) southwest of the old station, in a small public park along the River Hué between the Mayor's office and the Annamese War Memorial, 280 feet (85.3 meters) northeast of a drainage canal, 125 feet (38.1 meters) southwest of edge of mound on which stood the Annamese War Memorial, and 180 feet (54.9 meters) northwest of near edge of footpath on Rue Jules Ferry. True bearings: north edge of first pier on south end of railroad bridge, 88° 28'.6; east edge of stone rampart around citadel, 166° 29'.0; north side of west pier on footbridge, 212° 15'.9; top of Annamese War Memorial, 234° 36'.4.

Pnompenh, Cambodia, 1938.--Near center of an area of government land used as a football field, directly to south of Royal Hotel, 102.2 feet (31.15 meters) from near corner of high wall to the west, 153.5 feet (46.79 meters) from lamppost on road to north, and about 320 feet (98 meters) from lamppost on street to south. True bearings: west corner of church, near ground, 122° 31'.7; ornament on west gable of Royal Hotel, 163° 59'.7; ornament on west end of Residence office, 226° 46'.0; center of lamppost on street to south, 354° 39'.9.

Siemreap (Angkor), Cambodia, 1938.--The 1912 site at Angkor-Vat was unavailable because it was occupied by buildings. A new station was established near the northwest corner of the football field at the rear of Grand Hotel, 70.6 feet (21.52 meters) from the northwest corner post of football ground, 115.0 feet (35.05 meters) from the nearest goal post, 105.3 feet (32.10 meters) from near telegraph pole to the northwest; marked by 2 by 2 inch (5 by 5 centimeter) wooden stake driven just below surface. True bearings: center of louvers on west window of hotel, 7° 29'.8; far telegraph pole to west of hotel, 13° 22'.5; top of center tower of Angkor-Vat, 6 kilometers, 188° 37'.5; ornament on house to east, 274° 17'.1; northeast corner of hotel at ground level, 347° 34'.5.

Vinh, Annam, 1938.--Near northwest corner of stadium which was immediately west of the citadel, 141.0 feet (42.98 meters) from northwest corner post of football ground, and 36.5 feet (11.12 meters) from nearest point of west boundary of the football field. True

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bearings: ornament on house to south, 1° 28'.4; downspout on house to south, 1° 34'.5; lightning rod on spire of cathedral visible over roof of grandstand, 17° 09'.7; peak of mountain to northwest, 138° 58'.5; top of northwest corner post of football ground, 163° 08'.9; top of northeast corner post of football ground, 250° 15'.8; right edge of water tank of hospital, 300° 38'.9.

Iran (Persia)

Damghan, 1928.--About 2 kilometers north of the city gate, 40 meters south of the first riverbank, and 50 meters west of the road; not marked. True bearing: tip of large stone pyramid in the town, 341° 40'.0.

Duzdap, 1928.--On grounds of the British consulate, 48 meters from the north corner of the main office building, 29 meters west of second small hut in row from main office, and 150 meters from the telegraph line to the north; marked by a buried dry cell set flush with the surface. True bearing: indicator support on railroad water tower, 40° 37'.0.

Khunak, 1928.--At a caravan resting place beside the road 80 kilometers from the village. The station was 75 meters west of the road, 200 meters northeast of a sulphur spring, and 400 meters northwest of a large sharp-cornered stone on a hill through which the road passed; marked by a pile of stones. True bearing: sharp corner of the above-mentioned stone, 319° 50'.7.

Sabzawar, 1928.--About 54 kilometers east of the village, along the road to an old Persian fort with freshwater well. The station was 50 meters east of the fort in line with its south wall, 120 meters south of the road, and on the edge of a dry river bed; marked by pile of stones. True bearing: telegraph pole No. 9 counted from the fort along the road.

Sharifabad, 1928.--The station was by the roadside 65 kilometers south of the village near point where a small river crossed the road, the first river met after leaving the village, 150 meters east of the road, and 30 meters north of an irrigation ditch; marked by pile of stones. True bearing: first telegraph pole north of bridge, 170° 21'.5.

Shusp, 1928.--On an open dry plain 14 kilometers by road southeast of the village, 300 meters perpendicularly north of the road, and a short distance east of a dry river bed which crossed the road; not marked. True bearing: distant telegraph pole, 5 kilometers, 42° 40'.9; second telegraph pole, 41° 29'.3.

Teheran, 1928.--On the road leading northward from the Daule gate in the north wall of the city, about 3 kilometers north of the gate, 60 meters west of the road, and 800 meters from the telegraph line running northwestward from the American legation which was on the same road about 1 kilometer north of the city gate; marked by pile of stones covering a cow's leg bone. True bearing: tip of the apparent right minaret on the Daule gate, 325° 28'.7.

Iraq

Babylon, 1928.--Southeast of Bagdad, about 56 miles (90 kilometers) by road, on the plain, 300 meters north of the northeast corner of the big old wall surrounding the ruins of Babylon, and about 800 meters south of the Basra-Bagdad railway; not marked. True bearing: first telegraph pole visible at west of low hills along railroad, 245° 00'.2.

Bagdad, 1928, 1937.--The station of 1928 was located 12 miles (20 kilometers) southeast of the city on the British experimental farm at Rastamie, and about 2 miles (3 kilometers) from the British flying field at Hinadi. The station was in the middle of the farm on the north side of the main irrigation canal; marked by a peg surrounded by a low mud wall. True bearing: flagpole on the main office building, 280° 26'.4.

The station of 1937 was located approximately 1 kilometer southeast of the station of 1910, owing to local conditions present at the old station. A new station was selected at the race track of the Iraq Racing Company, near the center of the infield of the track, about 250 meters from the northwest end of the track, and directly in front of the Italian Legation house about 200 meters distant. True bearing: ball on top of chimney on northwest corner of two-story brick house, 27° 12'.5; base of flagpole on the Italian Legation, 50° 33'.9; smokestack on old power plant downtown, 110° 03'.4; northeast corner of old English cemetery wall, 128° 38'.9; top of large red oil-storage tank, 138° 53'.4; westernmost smokestack of group at brick plant, 217° 43'.2; green pointed top on race track grandstand, 333° 30'.9.

Basra, 1937.--Close reoccupation of the stations of 1909 and 1911. The buildings shown on the original sketch were still in use, however the creek shown on the east side of the property had been filled in since the last occupation; otherwise the property was as shown on the 1909 sketch. True bearing: an insulator on a power line pole, about 300 meters distant, 113° 44'.4.

Kizil, Robat, 1928.--About 2 kilometers northeast of the village, 50 meters perpendicularly southward from the main irrigation ditch, 500 meters from the road leading from the village to the bridge crossing the irrigation ditch, about 2 kilometers east of the railroad to Bagdad, and about 600 meters north-northeast of a large date farm surrounded by a mud wall; not marked. True bearing: telegraph pole along the railroad, 97° 17'.4.

Japan

Kakioka Observatory, Tokio, 1929.-- All observations were made in the "old" absolute house. It was intended shortly to transfer absolute work to a new building, an extended series of absolute observations being contemplated to correlate the two sites. For declination and horizontal intensity, Pier 1 was used. For inclination the earth inductor was mounted on Pier 2, the observatory galvanometer, mounted on a separate pier, being used.

Malaya

Alor Star, Kedah, 1938.-- Near northwest corner of Alor Star Aerodrome. The corner was marked by a rectangular-shaped concrete slab, the two arms of the slab extending north-south and east-west. The station was established 58.3 feet (17.77 meters) due east of the

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Malaya--concluded

arm extending east-west; marked by a 2 by 2 inch (5 by 5 centimeter) wooden peg left 1 inch (2.5 centimeters) below ground surface. True bearings: south edge of north arm of concrete slab, 58.3 feet, 96° 13′; gable on porch of resthouse, 152° 13′.4; head of anemometer tube at meteorological station, 268° 43′.0; support of wind indicator on south of aerodrome, 352° 16′.8.

Ipoh, Perak, 1938.-- On a narrow footpath along the middle of a high embankment on the east bank of the Kinta River, about 370 feet (113 meters) downstream from the southeastern end of Jalan Datoh Bridge, 14.0 feet (4.27 meters) from west edge and 13.5 feet (4.11 meters) from east edge of the embankment, and 72.5 feet (22.10 meters) south of a cairn of granite boulders; marked by a 2 by 2 inch (5 by 5 centimeter) wooden peg driven 1 inch (2.5 centimeters) below ground level. True bearings: near corner of stone pillar on west bank of river, 39° 19′.4; pole on tower of Hong Kong and Shanghai Bank, 191° 27′.7; ornament on top of market building, 207° 00′.2.

Kuala Lumpur, 1938.-- On golf course, north of golf course road, 157.6 feet (48.04 meters) north of terminal of Malayan Base Line; marked by a 3 by 3 inch (7 by 7 centimeter) concrete survey peg projecting 3 inches aboveground. This station was being tied into the Malayan Survey System and the exact position can be supplied by the Survey Department, Kuala Lumpur. True bearings: base-line peg, 157.6 feet, 7° 49′.2; near gable on house to west, 114° 32′.2; trigonometric mark on Mount Pudoh, 2.3 miles (3.7 kilometers), 344° 38′.8.

Malacca, 1938.-- In Banda Hilis Park, between government resthouse and the sea, in line with southwest end of fenced enclosure used as a childrens' playground, and 99.2 feet (30.24 meters) northwest of west corner of the playground; marked by a 4 by 4 inch (10 by 10 centimeter) concrete block set by the Municipal Survey Department. True bearings: beacon on small island to south, 19° 58′.5; light on east mole, 75° 41′.0; light on west mole, 78° 05′.2; light on end of short jetty, 94° 17′.0; wind vane on ruined church on hill, 129° 15′.5; cross on center of school building, 179° 45′.4; beacon on rocks to southeast, 340° 53′.5.

Penang, 1938.-- Near south corner of reserve containing polo ground, near angle formed by Residency Road and Western Road, 202.0 feet (61.57 meters) from survey post at junction of above roads, 335.0 feet (102.11 meters) from survey post, almost due west, along Western Road, and 691.2 feet (210.68 meters) from next survey post along Western Road; marked by a 5 by 5 inch (12.7 by 12.7 centimeter) concrete survey block set 6 inches (15 centimeters) below ground surface. True bearings: fire hydrant to southwest, 58° 17′.0; survey post on Western Road, 88° 53′.5; survey post on Western Road, 106° 54′.1; street-name post near gates at Sepoy Lines, 120° 21′.4; base of flagpole on nurses' quarters, 262° 03′.8; fire hydrant to northeast, 236° 04′.5; survey post near corner of reserve, 359° 11′.7.

Singapore, 1938.-- Previous CIW stations here were found unsuitable or impossible for reoccupation. A new station was established on the Municipal Airport about 2 miles (3 kilometers) east of the city, about 400 yards (365 meters) east of the airport administration and hotel building; on the line joining an illuminated wind vane and a floodlight tower, 142.1 feet (43.31 meters) from nearest point of the tower. The station was outside the actual landing area, which was enclosed by an artificial drainage canal. True bearings: center top of floodlight tower on south side of aerodrome, 7° 10′.7; spire of St. Andrew's Cathedral, 61° 07′.0; base of beacon mast on control tower, 95° 25′.2; central support of illuminated wind vane, 112° 41′.2; center top of near floodlight tower, 294° 57′.6.

Syria

Abu Kemal, 1928.-- On open plain west of the small village, 125 meters northwest of the French passport-control office, and 150 meters from the south corner of a mud building to the north; not marked. True bearing: minaret about 300 meters to the southeast, 308° 44′.0.

Aleppo, 1928.--Proximate reoccupation of the station of 1910 which could not be used because it was at this time covered with government buildings. The new station was about 500 yards (450 meters) southwest of the former position and across the road; not marked. True bearings: trigonometric mark on top of main government building, 212° 15′.9; minaret on citadel, 305° 26′.0.

Jerablus, 1928.--On plain near the river Euphrates, about 1 mile from the village Jerablus. The station may be disturbed, the whole plain being cultivated from time to time; marked by a tent peg and a small pyramid of stones. True bearing: small mast at the French radio station, 90° 26′.3.

Meskene, 1928.-- Near the village watering place on a low plain below the main plateau, about 8 meters north of the track from Meskene to the ferry landing; marked by a tent peg. True bearing: the right side of a lofty Arabic ruin tower at highest point of masonry, 338° 51′.8.

Rakka, 1928.--On the grounds of the French air station at Rakka, 40 meters from the southwest corner of the old officers' quarters and in line with this corner and the corner of a mud wall to the southwest; marked by a brickstone set flush with the hard grass surface. True bearings: minaret to the east, 268° 42′.8; ball on top of mast west of hangar to the north, 183° 43′.2.

Thailand (Siam)

Aranya Pradesa, 1938.-- On open ground at rear of government resthouse, almost in line with southwest side of fence around resthouse grounds, 154.8 feet (47.18 meters) from west corner of fence, and 274.0 feet (83.52 meters) from north corner of fence; marked by wooden stake driven 2 inches (5 centimeters) below ground surface. True bearings: ornament on front gable of house to south, 11° 10′.7; flagpole on front of sports pavilion, 62° 26′.6; gauge on water tank in railroad yards, 180° 40′.7; top of flagpole at railroad station, 249° 52′.5; top of north corner post of fence around resthouse, 252° 24′.1; top of west corner post of fence around resthouse, 312° 17′.4.

Bangkok, 1938.--A close reoccupation of the station of 1912, near center of golf course which was inside the race track of the Royal Siamese Sports Club. The new station was almost due east of the center of the clubhouse, True bearings: base of pole on center gable of clubhouse, 104° 45′.9; top of tower on Wat Sarpatoom,

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179° 18′.3; center of left-hand wireless tower, 309° 44′.8; pole on left-hand water tower, 340° 04′.6.

Chumphon, 1938.--At southeast end of grounds around government resthouse, in line with rear wall of front portion of resthouse, 62.7 feet (19.11 meters) from fence at southeast end of grounds, 96.8 feet (29.50 meters) from fence on northeast side (facing road) of grounds, 81.8 feet (24.93 meters) from fence on southwest side of grounds, 104.0 feet (31.70 meters) from nearest point of path between the magnetic station and the resthouse. True bearings: front gable of house across railroad, 100° 21′.6; near corner of resthouse, 134° 55′.8; lamp at entrance to railroad station, 146° 43′.2.

Hua Hin, 1938.--Towards western boundary of grounds of the Hua Hin Hotel, in line with eastern side of fence around tennis courts, 53.0 feet (16.15 meters) from northeast corner of this fence, 43.0 feet (13.11 meters) from path along north end of tennis courts, from hotel to main road, and 98 feet (29.87 meters) from cactus hedge to west. True bearing: left edge of signpost at main entrance gate, 204° 02′.0.

Tung Song, 1938.--Near northeast corner of government reserve used as playing area, in line with east wall (front) of post office, 84 feet (25.60 meters) from near edge of path along north boundary of playing area, and 72 feet (21.95 meters) from fence along road to east of area; marked by a 3 by 3 inch (7 by 7 centimeter) wooden stake set 2 inches (5 centimeters) below ground level. True bearings: southeast corner of fence around tennis courts, 17° 07′.5; near (southeast) corner of post-office building, 172° 50′.1; ornament on front gable of police station, 276° 41′.2.

AUSTRALASIA

Australia

Adelaide, West Park, South Australia, 1944.--Exact reoccupation of South Australian Magnetic Survey station of 1927, 1933, 1934, 1935, and 1937, at north end of football ground in West Park, 12.5 feet (3.81 meters) southeast of most easterly of two tall goal posts, 200.8 feet (61.20 meters) south of iron and concrete electric-light pole, 166.5 feet (50.75 meters) south-southwest of corner post of four-wire fence, 243.3 feet (74.16 meters) west of iron and concrete electric-light pole, and 532.8 feet (162.40 meters) north-northeast of corner post of municipal fenced enclosure; marked by an earthenware pipe set in concrete, sunk about 2 inches (5 centimeters) below ground surface. True bearings: signpost on street, 7° 54′.5; northeast corner post of fenced enclosure (municipal council dump), 33° 35′.9; northwest corner of elevated steel water tank; 61° 29′.5; church spire at Thebarton, 117° 24′.2; church spire at North Adelaide, 183° 14′.8; northwest corner of seismic building at observatory, 224° 11′.3; southwest corner of transit house at observatory, 232° 24′.5; west spire on Roman Catholic Church, 288° 00′.4; Flinders monument on Mount Lofty, 294° 27′.8; right-hand chimney of red-roofed house near top of distant ridge, 338° 21′.8.

Albany, Western Australia, 1936, 1944.--The site of station A having become unsuitable for observations, a new station, B, was selected in 1936 in southeast part of racecourse known as the Centennial Oval, in line with the south goal posts of the football field and between them and the four-furlong post on the race track, 200.8 feet (61.20 meters) from the nearest goal post and 51 feet (15.5 meters) east of line of fence posts enclosing cycling track; marked by a jarrah peg 2 by 2 by 24 inches (5 by 5 by 61 centimeters) projecting 4 inches (10 centimeters) aboveground. True bearings: base of flagstaff on grandstand, 129° 13′.2; two-furlong post on race track, 197° 31′.8; three-furlong post on race track, 225° 55′.1; four-furlong post on race track, 272° 21′.2.

Alice Springs, Northern Territory, 1937.--Close reoccupation of CIW station of 1912, 207.0 feet (63.09 meters) northwest of the northwest corner of stockyard, 150.0 feet (45.72 meters) west and slightly south from the second telegraph pole north of the stockyard; marked by peg. True bearings: Alice Springs trigonometric station, 206° 53′.5; telegraph pole opposite a garden plot, 357° 04′.8.

Ardrossan, Yorke Peninsula, South Australia, 1936.--Close reoccupation of South Australian magnetic station of 1920, on recreation grounds in southwest section of town, in line with eastern edge of cricket pitch and 13 feet (4.0 meters) and 11.3 feet (3.48 meters), respectively, from the southwest and southeast corners at the southern end of the pitch, 321 feet (97.8 meters) from southeast corner of recreation ground and 244.3 feet (74.46 meters) from boundary fence in line with gable on veranda of house; marked by a 0.75 inch (1.8 centimeter) aluminum peg set just below surface of ground. True bearings: center of cross on east side of Church of England, 200 yards (183 meters), 157° 57′.8; apex of gable on west side of public school building, 250 yards (229 meters), 230° 18′.3; gable on veranda of house to southeast, 100 yards (91 meters), 322° 04′.2; gable of house to south, 355° 52′.0.

Augusta, Western Australia, 1944.--The CIW station of 1914 at Cape Leeuwin could not be reoccupied. A new station was established about 1 mile (1.6 kilometers) south of the township of Augusta on east side of road to Leeuwin, on open area south of War Memorial Monument, 27.5 feet (8.38 meters) south of southeast corner of fence around monument, 46.0 feet (14.02 meters) southeast of southwest corner of fence around monument, 47.3 feet (14.42 meters) south-southeast of monument center, and 15 feet (4.6 meters) west of drive passing around monument; marked with a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top with brass screw set in top, set flush with surface of ground. True bearings: white post on south side of road, about 1200 feet (360 meters), 95° 30′.9; white post on west side of road in town, 156° 27′.8; white post in town bearing C.O.R. sign, 156° 57′.8; left edge of chimney on red-roofed house near river, 167° 00′.6; extreme left top corner of monument to pioneers, 169° 14′.2.

Balladonia, Western Australia, 1936, 1944.--Two stations were occupied. Station A was a close reoccupation of CIW station of 1914, on bare rocky ground west of old telegraph station, 400.5 feet (122.07 meters) west

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Australia--continued

of the southeast corner of stone fence surrounding the telegraph station, 3 feet (0.9 meter) south of the line of the stone fence on south side of the telegraph station, and 145.8 feet (44.44 meters) north of the nearest telephone pole; marked with a small peg. True bearings: near post of gateway to south of grid on main road, 61° 06'.8; gable end of west wing of homestead, 218° 14'.6; top right corner of middle chimney on telegraph station, 260° 22'.2; ventilator on telegraph station near south chimney, 263° 32'.8; 136-mile post on main road, 333° 28'.6; top of iron telephone pole to south, 350° 15'.2.

Owing to apparent local disturbance at A, a new station, B, was established in 1944, about 1.4 miles (2.25 kilometers) east of the old telegraph station, 0.48 mile (0.77 kilometer) east of the 137-mile post on east-west road, near dam on south side of the eastwest road, in line with the north side of fenced enclosure around dam, 50.8 feet (15.48 meters) west of northwest corner of fenced enclosure, 252.2 feet (76.88 meters) south of fence corner on north side of eastwest road, 165.8 feet (50.54 meters) from nearest telephone line to north, and 114 feet (34.7 meters) south of center of eastwest road; not marked. True bearings: top of 137-mile post on eastwest road, 82° 29'.0; fourth telephone pole west of nearest pole north of station, 91° 05'.1; center at ground of post at bend in fence to north, 152° 33'.6; center at ground of nearest telephone pole, 163° 51'.6; fourth telephone pole east of nearest pole north of station, 253° 24'.4; mark on blazed tree to south, 353° 42'.2.

Barrow Creek, Northern Territory, 1937.--Close reoccupation of CIW station of 1912, on a flat about 20 yards (18 meters) east of telegraph line, 275.5 feet (83.97 meters) south from the southeast corner of the telegraph office, 163.5 feet (49.83 meters) from southeast corner of wall around a grave, 141 feet (42.98 meters) from the southeast corner of the meat house; marked by a peg. True bearing: southwest corner of telegraph station above veranda on south side, 183° 23'.3.

Belair, South Australia, 1936, 1944.--Intercomparison in 1936, with exchange of stations, between CIW magnetometers Nos. 6 and 28, and between CIW earth inductor No. 28 and dip-circle No. 226 (using needles Nos. 1 and 2) were made on the sports oval in National Park, Belair, near Adelaide. Station A was near the center of the oval, marked by a survey peg 3 by 3 inches (8 by 8 centimeters) driven flush with ground. True bearing: ornament on shelter, 9° 55'.1. Reoccupied in 1944.

Station B was 155 feet (47 meters) from A on the extension of the line joining A and the ornament on top of a shelter which was almost due south of A; not marked. True bearing: ornament on shelter, 9° 55'.1; hole in post near goal posts, 277° 44'.1.

Blacktown, New South Wales, 1937.--Two stations, A and B, were occupied, both located in southeast corner of St. Andrews Golf Course about 1 mile (1.6 kilometer west of Blacktown railway station, and about 600 feet (180 meters) northeast of clubhouse. Station A was 47.5 feet (14.48 meters) west of nearest point of wire fence which ran approximately north and south, and 96.6 feet (29.44 meters) northwest of near corner post in this fence; marked by a 2 by 2 inch (5 by 5 centimeter) hardwood peg driven flush with surface. True bearing: cross on church, 335° 30'.2.

Station B was 49.3 feet (15.03 meters) north of A, 52.3 feet (15.94 meters) from nearest point of wire fence, and 143.2 feet (43.65 meters) from the corner post; marked by a 2 by 2 inch (5 by 5 centimeter) hardwood peg driven flush with surface. True bearing: cross on church, 335° 55'.8.

Blacktown, B, New South Wales, 1938-1944.--Exact reoccupations annually, except in 1943, when three reoccupations were made, of CIW station of 1937, about 1 mile (1.6 kilometer) west of Blacktown railway station, in southeast corner of St. Andrews Golf Course, about 600 feet (180 meters) northeast of clubhouse, west of wire fence running approximately north and south and 52.3 feet (15.94 meters) from nearest point of this fence, 143.2 feet (43.65 meters) from fence corner post to south-southeast, and 49.3 feet (15.03 meters) north of station A; marked by a 2 by 2 inch (5 by 5 centimeter) hardwood peg set level with ground surface. True bearing: cross on church, 335° 55'.8.

Bombi, New South Wales, 1943.--About 4 miles (6 kilometers) along road from Kincumber to Pretty Beach, at northeast end of plateau where new road deviation had been made, 70 feet (21 meters) northwest of edge of a prominent sandstone outcrop, and a few feet north of the north side of the old road where it crossed the crest of the ridge; marked by a 4 by 2 inch (10 by 5 centimeter) hardwood peg projecting 5 inches (13 centimeters) aboveground. True bearings: declination mark, top insulator on power line pole, 18° 41'.7; trigonometric station beyond Woy Woy, about 9 miles (15 kilometers), 114° 14'.3; peg, 4 by 2 inches (10 by 5 centimeters) marking point of solar observations, 155.2 feet (47.30 meters), 192° 33'.7; trigonometric station on Tudibaring Point, about 3 miles (5 kilometers) 237° 56'.0.

Bordertown, South Australia, 1944.--Close reoccupation of CIW station of 1911, 1914, 1916, and 1923, and South Australian Magnetic Survey station of 1929, on racecourse and golf-links reserve, 199.0 feet (60.65 meters) east of southeast corner of small fenced enclosure, 630.5 feet (192.18 meters) southwest of the 182.5 mile-post on railway line, and 851.3 feet (259.48 meters) northwest of center of northwest corner post of iron railing fence around small cemetery; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top, sunk flush with ground surface, a brass screw set in top indicating the exact point. True bearings: left-hand edge of chimney on cottage facing highway, about 0.33 mile (0.5 kilometer), 14° 32'.0; southeast corner post of small fenced enclosure, 102° 04'.6; near gable end of old stone cottage, about 0.50 mile (0.8 kilometer), 112° 30'.8; 182.5 mile-post on railway, 244° 04'.5; center of northwest corner post of fence around small cemetery, 302° 48'.6.

Bradley Head, Sidney Harbor, New South Wales, 1944.--On grass flat on east side of Bradley Head, 92.0 feet (28.04 meters) southeast of small Norfolk Island pine tree, 91.5 feet (27.89 meters) north of near corner of high fence around building; marked by a 4 by 2 inch (10 by 5 centimeter) peg driven flush with ground surface. True bearings: center of tower on Manly Monastery, 39° 00'.6; light tower on Sow's Pigs, 50° 24'.6; lighthouse on South Head, 94° 04'.9; trigonometric beacon on Vaucluse water-reservoir tower, 113° 15'.1; light tower near Shark Island, 120° 51'.1. Much disturbance due to electric cars.

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Brisbane, Queensland, 1936.--The station of 1913, 1914, and 1922 having become unsuitable for magnetic work on account of construction, a new site was selected near the center of the Ascot Racecourse, slightly to the east of the foundations of two buildings which had been demolished, 38.9 feet (11.86 meters) southeast of near front corner of one foundation and 23.8 feet (7.25 meters) northeast of near corner of the other foundation; marked by 2 by 2 inch (5 by 5 centimeter) hardwood peg extending 1 inch (2.5 centimeters) aboveground. True bearings: ornament on left end of member's stand, 58° 47′.8; right edge of right-hand chimney of house on hill, 101° 09′.4; near gable end of church, 164° 22′.0; five-furlong post on racecourse, 241° 17′.8; four-furlong post on racecourse, 272° 40′.6; two-furlong post, 333° 43′.9.

Brisbane, Queensland, 1944.--As the CIW station of 1913, 1914, and 1922 could not be occupied because army temporary buildings had been erected nearby, and as the position of the 1936 station was not known to the observer on this occasion, a new station was selected on Mt. Petrie Rifle Range on Cleveland Road about 10 miles (16 kilometers) from Brisbane, in lightly-timbered area west of the shelter shed, 187.4 feet (57.12 meters) west of telephone post north of shelter shed, 155.5 feet (47.40 meters) west of southwest corner of shelter shed, 311.0 feet (94.79 meters) northwest of telephone post alongside 300 yard range-butts, 633.0 feet (192.94 meters) north of 3 by 3 inch (8 by 8 centimeter) hardwood peg projecting 5 inches (13 centimeters) aboveground and used as a mark; marked by a 3 by 3 inch (8 by 8 centimeter) hardwood post projecting 5 inches (13 centimeters) aboveground. True bearings: peg used as mark, 0° 23′.5; telephone post north of shelter shed, 273° 40′.0; southwest corner of shelter shed, 290° 55′.2; telephone post alongside 300 yard range-butts, 322° 49′.4.

Broken Hill, B, New South Wales, 1944.--The locality of the CIW station of 1911 and 1923 was no longer suitable owing to the presence of water-pipe lines. A new station was established on the racecourse north of the town, in line with the southern end of the stone grandstand, 453.1 feet (138.10 meters) east of the southeast corner of the stone grandstand, 130.3 feet (39.72 meters) from the near end of the east wing of a brush hurdle, and 150.3 feet (45.81 meters) from end of fence dividing hurdle tracks; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top, a brass screw set in top indicating exact spot. True bearings: center of highest chimney stack in town, 7° 22′.1; southeast corner of stone grandstand, 123° 56′.9; ornament on roof at south end of stone grandstand, 124° 59′.9; 3-furlong post, 229° 38′.9; near corner of old stone building, about 1 mile (1.6 kilometer), 301° 40′.8.

Broome, Western Australia, 1944.--Close reoccupation of CIW station of 1914 and 1921, in low scrub about 0.25 mile (0.4 kilometer) west of jetty, 0.75 mile (1.2 kilometer) south of wireless station, 204 feet (62.2 meters) from west end of north arm and 210 feet (64.0 meters) from west end of south arm, respectively, of cattle lead joining cattle race on jetty; marked by a small jarrah peg sunk flush with ground surface. True bearings: left edge of chimney stack at meatworks, 68° 49′.4; aerial mast at wireless station, 171° 25′.4; top of signal mast, 239° 11′.2; center of prominent headstone in cemetery, 253° 44′.2; white electric-light pole on jetty, 285° 40′.5.

Bunbury, B, Western Australia, 1936, 1944.--Exact reoccupation of CIW 1921 station, near middle of recreation ground known as Forrest Park, a large open space surrounded by "bush," about 1.5 mile (2.4 kilometers) southeast of the town, behind tennis courts on the Picton road, 24.5 feet (7.47 meters) east of southeast corner of and in line with south edge of cricket pitch in center of park; not marked owing to proximity to cricket pitch. True bearings: southeast corner of sports shed, about 450 feet (137 meters), 132° 02′.7; center pole of tennis courts, about 1000 feet (305 meters), 167° 15′.1; northeast veranda post of house back of large tree, 315° 55′.1.

Camooweal, Queensland, 1936, 1939.--The 1936 occupation was a close reoccupation and the 1939 occupation was an exact reoccupation of CIW station of 1913, on grounds of the pound reserve east of Morrison Street, 217.5 feet (66.29 meters) from northwest corner of reserve; 314.5 feet (95.86 meters) from northeast corner of reserve, 317.9 feet (96.90 meters) from base of an aerial mast on grounds of Post and Telegraph reserve; marked by heavy peg flush with surface of ground. True bearings: tip of tower on post office, 113° 15′.7; steel aerial mast near post office, 123° 40′.5; tower on police station, 150° 43′.3; northeast corner of pound reserve, 235° 07′.8; post to southward, 355° 03′.9.

Carnarvon, 1938, 1944.--On low sand hills, about 200 feet (61 meters) northwest of shore end of jetty, practically due west of elevated tank at railway sheds; unmarked. True bearings: post on jetty, 38° 39′.0; top left corner of elevated tank at railway sheds, 269° 06′.0; top of ornament on lighthouse, 296° 12′.9.

Ceduna, South Australia, 1934, 1936, 1944.--Three stations were occupied. Station A was a close reoccupation of CIW station of 1911 and 1923, approximately 15 yards (14 meters) north of the former location, 118 feet (36 meters) from a point 7.5 feet (2.29 meters) south of hydrant post at roadside and in line with the Thevenard Gypsum Works, and 102 feet (31.1 meters) from the dividing line between lots 13 and 14; not marked. True bearings: cross on gable at seaward end of roof of Roman Catholic Church on Thevenard Road, 1 mile (1.6 kilometers), 12° 44′.1; near gable of house, 2 miles (3 kilometers) 39° 34′.7; center of mooring post on jetty, 0.33 mile (0.5 kilometer), 133° 26′.0; spike on front of gable of Hotel Ceduna, 0.25 mile (0.4 kilometer), 178° 08′.8; steeple on Methodist Church, 0.5 mile (0.8 kilometer), 190° 03′.0.

Station B was an exact reoccupation of CIW station of 1936, on reserve to northeast of town, about 1000 feet (305 meters) east of large town catchment tank near northern edge of new road towards aerodrome, and in line with western side of Cross Street in town; marked with a 1.5 by 1.5 inch (3.8 by 3.8 centimeter) softwood peg 12 inches (30 centimeters) long, sunk flush with ground surface. True bearings: north corner of cottage, 5° 50′.1; spire on Methodist Church, 72° 36′.7; near cross on top of Lutheran Church, 98° 38′.0; near gable end of golf clubhouse, 124° 02′.4; east gable end of totalizator house, 181° 46′.1.

Station C. The location of B was considered unsatisfactory because of the proximinity of a new road within a few yards. The new station, C, was therefore selected about 1500 feet (450 meters) north-northwest of B, on the recreation reserve, on the northern part of cricket

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ground, 196.5 feet (59.89 meters) north-northeast of center of concrete cricket pitch, 533 feet (162.5 meters) north of the northwest corner of concrete water tank, and 500 feet (150 meters) north of the northeast corner of concrete water tank; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top, sunk flush with ground surface. True bearings: spire on Methodist Church, 35° 54'.8; cross on east end at top of Lutheran Church, 40° 47'.9; pointed top of elevated tank at hospital, 94° 28'.7; center of east gable of totalizator house, 200° 08'.0; east gable end of galvanized cottage, 307° 58'.6.

Clermont, Queensland, 1936, 1939.--Two stations were occupied. Station B (1936) was an approximate reoccupation of CIW station of 1913, 0.50 mile (0.8 kilometer) south of the old location, on level ground about 0.50 mile (0.8 kilometer) north of and in line with Capella Street which was the main street of the town, 15.0 feet (4.57 meters) east of a road post and in line with it and a fence 217.2 feet (66.20 meters) eastward which formed the south boundary of an unnamed street; marked by a hardwood peg 2 by 2 inches (5 by 5 centimeters) extending 1 inch (2.5 centimeters) aboveground. True bearings: rear gable end of Leo Hotel, 11° 23'.8; cross on near gable end of Catholic Church, 32° 33'.5; "Alpha Ceramac" Road signpost, 49° 17'.1; telegraph pole in front of distant house to westward, 84° 03'.3; near gable end of open shed in cemetery, 223° 59'.1; near corner post of road, 217.2 feet (66.20 meters), 276° 47'.

Station A (1939) was a close reoccupation of CIW station of 1913, on recreation reserve, across Lime Street north and slightly east of Masonic Hall. The northeast corner of the intersection at Karamoo and Lime Streets was distant 205.5 feet (62.64 meters) and bears S 65° 14' W; the southeast corner of this same intersection was distant 271.0 feet (82.60 meters) and bears S 47° 05' W and the northeast corner of the intersection at East and Drummond Streets was distant 560 feet (170.7 meters) and bears N 63° 44' E. True bearings: flagpole on Town Hall, 18° 09'.5; northeast corner of Masonic Hall, 18° 40'.1.

Cloncurry, Queensland, 1936, 1937, 1939.--The occupations of 1936 and 1937 were close reoccupations and the occupation of 1939 was an exact reoccupation of CIW station A of 1923, in southeast corner of town reserve, north of cemetery and west of Sheaffe Street, 399.5 feet (121.77 meters) northeast of the northwest corner of cemetery and 499 feet (152.1 meters) northwest of northeast corner of same; marked by 3 by 3 inch (7.5 by 7.5 centimeter) hardwood peg flush with surface of ground. True bearings: (1939) northwest corner post of cemetery fence, 29° 14'.0; left gable of engine shed at railway yards, 298° 34'.0; northeast corner post of cemetery fence, 315° 36'.2; left gable of railway station, 320° 23'.9; upper front cross on Roman Catholic Church, 336° 56'.2.

Collaroy, New South Wales, 1943.--On hill immediately west of town, and 342 feet (104.2 meters) west of Ramsay trigonometric station; marked by a 4 by 2 inch (10 by 5 centimeter) softwood peg projecting 9 inches (23 centimeters) aboveground. True bearings: Ramsay trigonometric station, 100° 23'.8; high-level reservoir, Vaucluse, 180° 40'.2; trigonometric station near French's Forest Road (?), 4 miles (6.5 kilometers), 280° 23'.8.

Conistan Station, Northern Territory, 1939.--On flat ground west of station house, 128.0 feet (39.01 meters) from southwest corner of meat house; 218.5 feet (66.60 meters) from northwest corner of stockyard; marked by a 4 by 4 inch (10 by 10 centimeter) hardwood post sunk flush with surface. True bearings: a tree stump, 44° 31'.0; southwest corner of meat house, 222° 37'.5; northwest corner of stockyard, 317° 45'.5.

Coolgardie, Western Australia, 1936, 1944.--Close reoccupation of CIW station of 1912 and 1914, in park lands on north side of town in section bounded by Toorak, Moran, MacDonald and Jobson Streets, about 120 feet (36 meters) west of twin gum trees; marked by jarrah peg 2 inches (5 centimeters) square driven just below the surface. True bearings: white mark on reservoir on hill, 210° 36'.0; cross on front of Catholic Church, 330° 08'.0; cross on left gable end of convent, 345° 28'.2.

Cottesloe, A, Western Australia, 1944.--Close reoccupation of CIW station of 1914 and 1921 in the Government Endowment Reserve, northeast of junction of Grant and Marmion Streets, 146 feet (44.5 meters) from south boundary of Reserve, and 188.5 feet (57.45 meters) from west boundary of Reserve; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top, sunk flush with ground surface, a brass screw set in top indicating exact spot. True bearings: right edge of tank near windmill, 21° 29'.0; left edge of near chimney on Bel Air Flats, 72° 43'.5; ornament on front gable of cottage, about 0.25 mile (0.4 kilometer), 120° 02'.6; pointed top of tank near windmill on slope about 1 mile (1.6 kilometer) to north, 186° 46'.9; left edge of chimney on green-roofed cottage, 220° 13'.6; base of ornament on top of red-roofed house, about 150 yards (137 meters), 262° 14'.3; left edge at bottom of nearer of two cottage chimneys prominent on the skyline, 299° 52'.2.

Croydon, Queensland, 1938, 1940.--Exact reoccupations of CIW stations of 1912 and 1923; on unoccupied ground east of the hospital, about 0.6 mile (1 kilometer) south of railway station, 343.6 feet (104.73 meters) from southeast corner of hospital fence, 386.0 feet (117.6 meters) from northeast corner; marked by concrete post 4.5 by 4.5 inches (11.5 by 11.5 centimeters) flush with surface of ground. True bearings: southeast corner of hospital fence, 68° 09'.2; northeast corner of hospital fence, 149° 43'.5.

Daly Waters, Northern Territory, 1937.--Close reoccupation of CIW station of 1912, on open flat about 100 yards (91 meters) northwest of water hole in Daly Waters, about 5 miles (8 kilometers) south of telegraph station; marked by peg. True bearings: tree to southward, 10° 27'.9.

Darwin, Northern Territory, 1944.--Approximate reoccupation of CIW station of 1923 which was a close reoccupation of CIW stations of 1912 and 1914, near north end of Mindil Beach, on small open piece of ground 60 feet (18.3 meters) south of road running parallel with the beach, and about 300 feet (90 meters) west of road leading from the main road to the north end of Mindil Beach; marked by a concrete block with a .303 cartridge shell embedded in its top center, installed by RAAF personnel. True bearings: center of ventilator on green-roofed house on Myilly Point, 57° 24'.8; Point Charles lighthouse, 105° 19'.2; edge of cliff at Dudley Point, 153° 42'.9; disk beacon on elevated water tank, 235° 50'.7.

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East Maitland, New South Wales, 1943.--Close reoccupation of CIW station of 1913 and 1921, in northeast half of large park on rise in southern part of town, south of south corner of William and Park Streets, 397 feet (121.0 meters) from north corner post of park, and 226 feet (68.9 meters) from northwest fence of park; marked by small hardwood peg driven flush with ground. True bearings: electric-light pole at corner of William and Rouse Streets, 117° 17′.3; high church steeple at West Maitland, 3 miles (5 kilometers), 123° 16′.7; belfry, Church of England, 500 feet (150 meters), 170° 37′.2; north corner post of park, 397 feet (121.0 meters), 199° 55′.6; center of clockface on jail, 1 mile (1.6 kilometer), 228° 25′.3; top cross at front of new Roman Catholic Church, 0.25 mile (400 meters), 258° 18′.0; upright post on water tank, 359° 01′.3. Levelling operations about 1932 had removed soil to depth of about 2 feet (0.6 meters) in vicinity of station.

Edithburgh, South Australia, 1936.-- Exact reoccupation of CIW station of 1911 and 1924, in triangular-shaped portion of park land immediately west of the township and about 0.50 mile (0.8 kilometer) from the jetty; about 700 yards (640 meters) west-northwest of large stone house near jetty, 300 yards (275 meters) north-northwest of stone shop on corner of main street, 131 feet (39.9 meters) from fence along Yorketown Road and 350 feet (107 meters) from a fence to east; marked by jarrah peg 2 by 3 inches (5.0 by 7.5 centimeters) set slightly below surface. True bearings: ornament on gable of red-roofed galvanized iron shed on football ground, 37° 34′.6; near corner of white-roofed brick house, 200 yards (183 meters), 108° 15′.3; east gable of public school building, 400 yards (366 meters), 211° 07′.0; spire of Anglican Church, 350 yards (320 meters) 272° 18′.7; ornament on stone house near jetty, 700 yards (640 meters), 293° 53′.6.

Esperance, Western Australia, 1944.--The CIW station of 1914 could not be reoccupied, so a new station, B, was established on the cricket field 0.75 mile (1.2 kilometers) from the post office along the road to Pink Lake, 59.3 feet (18.07 meters) east of the southeast corner of asphalt cricket pitch, 83.8 feet (25.54 meters) southeast of the northeast corner of the cricket pitch, 277.5 feet (84.58 meters) from northeast corner of sports shed, and 291.0 feet (88.70 meters) northeast of bend in fence forming southern boundary of cricket ground; marked with a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top with brass screw set in the top. True bearings: northeast corner of sports shed on cricket ground, 51° 31′.1; veranda post near corner of most westerly building at wireless station, 331° 03′.5; aerial mast at wireless station, 332° 27′.2; northeast corner of small galvanized iron dwelling beside road, 349° 50′.7.

Eucla, Western Australia, 1936, 1944.--Site of station of 1911 and 1914 was found covered by nearly 10 feet of drift sand. A new site, station B, was selected about 500 feet (152 meters) due north of the homestead occupied by Mr. Simon, 40.5 feet (12.34 meters) east of the road running northward to the cliff enroute to Adelaide, between and in line with two survey pegs, 74.1 feet (22.56 meters) north of the southerly peg marked "174," and 146.7 feet (44.63 meters) south of the northerly peg marked "175;" marked by a jarrah post 5 by 5 by 24 inches (13 by 13 by 61 centimeters) extending 4 inches (10 centimeters) aboveground. True bearings: second telegraph pole west of tennis court, 38° 52′.4; center of left ventilator on billiard hall, 330° 47′.1; weather vane on near house to south, 357° 19′.5.

Flinders, South Australia, 1934.--Exact reoccupation of CIW station of 1911, about 0.75 mile (1.2 kilometer) northwest of jetty and hotel, north of the Roman Catholic Church and beyond hospital, 17 feet (5.2 meters) from edge of small bluff; marked by peg. True bearings: center of front face of church, 39° 16′.1; top of flagpole on church, 39° 18′.6; outer edge of shed on shore end of jetty, 59° 48′.9; center of cross on Roman Catholic Church, 352° 25′.0.

Fremantle, Western Australia, 1944.-- In southeast corner of Fremantle Golf Links, 849.4 feet (258.90 meters) from east boundary of golf links, and 66.3 feet (20.21 meters) from south boundary of links; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at the top, sunk flush with ground surface, a brass screw set in the top indicating the exact spot. True bearings: near cross on top of Roman Catholic Church, 48° 43′.2; center at top of War Memorial, 104° 32′.0; near gable end of stone shed, 306° 41′.4; white post, 342° 09′.3.

Geraldton, B, Western Australia, 1944.--The CIW station of 1921 was no longer available owing to building operations. A new station, B, was therefore established on the Geraldton racecourse 2.5 miles (4 kilometers) east of town, 215 feet (65.6 meters) north of race track in line with eastern end of grandstand, 313 feet (95.5 meters) north of northeast corner of grandstand, and 359.5 feet (109.58 meters) northwest of corner of picket-fence enclosure; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at the top set flush with ground surface, a brass screw set in the top indicating the exact spot. True bearings: flagpole on eastern gable of red-roofed building, about 1 mile (1.6 kilometer), 97° 10′.9; west end of large building, about 2 miles (3 kilometers), 153° 37′.7; trigonometric survey beacon on flat-topped hill, about 5 miles (8 kilometers), 240° 30′.3; cross on monument in War Cemetery, 294° 43′.5; base of flagpole at eastern end of grandstand, 347° 50′.5.

Goolwa, South Australia, 1934.--Exact reoccupation of CIW station of 1918 and 1929, in public school reserve about 0.75 mile (1.2 kilometer) north-northeast of Goolwa township at a point north of schoolhouse and yard near middle of reserve; marked by concrete circle flush with the ground, Geodetic and Magnetic Survey of South Australia, having crossarms pointing north-south and east-west, engraved ϕ 35° 30′.0 S, λ 138° 46′.8 E. True bearings: iron telegraph pole to south, 0.50 mile (0.8 kilometer), 18° 36′.0; crown post on railway curve to north, about 90 yards (82 meters), 177° 52′.0; crown post on railway curve to east, nearer Goolwa, 356 yards (326 meters), 263° 04′.4.

Goondiwindi, Queensland, 1944.--Close reoccupation of CIW station A of 1922, near southeast corner of recreation park, 69.0 feet (21.03 meters) east of west fence of park, 80.8 feet (24.63 meters) north of south fence, 66 feet (20.1 meters) south-southeast of lone tree, and 105.4 feet (32.13 meters) southwest of near corner of brick pier of the Melbourne Observatory eclipse expedition; marked by a 3 by 3 inch (8 by 8 centimeter) hardwood

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peg driven flush with ground. True bearings: ornament on roof of house, 92° 23′.5; center of ornament on front of house second from corner, 195° 16′.0; center of top cross on convent, 257° 41′.8; center of near cross on convent, 258° 22′.2; right edge of new concrete water tank, 276° 49′.5.

The Granites, Northern Territory, 1939.--On flat country about 1700 feet (518 meters) northwest of Twin Hills, about 2.2 miles (3.5 kilometers) northwest of Chapman's Hill; and 274.3 feet (83.61 meters) from mining-lease survey peg No. 840 which bears S 24° 30′.4 W; marked by a 3 by 3 inch (7.5 by 7.5 centimeter) hardwood peg sunk flush with surface.

The Granites Road Station No. 1, Northern Territory, 1939.-- On west side of road near a clump of wattle trees about 0.33 mile (0.5 kilometer) north of a low laterite ridge, and about 25 miles (40 kilometers) north of Mt. Patricia. True bearing: tree to southwest, 55° 44′.7.

The Granites Road Station No. 2, Northern Territory, 1939.--On western side of road near large gum tree, about 15 miles (24 kilometers) north of Mt. Campbell. The mark used was a temporary stake.

Hay, New South Wales, 1944.--Approximate reoccupation of CIW station of 1911 on school playground west of the Hay War Memorial High School, in line with and north of north-south fence enclosing Recreation Ground, 108.0 feet (32.92 meters) north of the southern fenced boundary of school playground, and 632.2 feet (19.70 meters) west of eastern boundary of school playground; marked by a concrete block 12 inches (30 centimeters) long, 4 inches (10 centimeters) in diameter at top, sunk flush with ground surface, a brass screw set in top indicating the exact spot. True bearings: ornament on right-hand gate post at double-fronted brick cottage, 13° 51′.3; near gable end of small cottage, about 0.50 mile (0.8 kilometer), 87° 13′.4; ornament on main south gable of green-roofed house, 0.75 mile (1.2 kilometer), 178° 00′.4; flagpole on front of War Memorial High School, 265° 42′.2; right edge of elevated water tank, 341° 56′.0.

Jericho, Queensland, 1939.--Close reoccupation of CIW station of 1913, in stock and camping reserve north of town and just beyond railway enclosure, 244 feet (74.3 meters) from northeast corner post of railway enclosure, 473.0 feet (144.17 meters) from post at corner of enclosure at Edison Street; marked by a 2 by 2 inch (5 by 5 centimeter) wooden stake flush with surface. True bearings: corner of enclosure at Edison Street, 24° 18′.6; northwest corner of enclosure, 310° 43′.7; gable at west end of railway station, 325° 09′.4.

Kuitpo Forest, South Australia, 1934.--Located in Pinus Insignis Forest Reserve of the South Australian Government's Woods and Forests Department; on gently sloping ground west of large wooden hut used by Adelaide University surveying students as a camp; 206.2 feet (62.8 meters) from the northwest corner of the hut, 46 feet (14.0 meters) from southeast corner of cricket pitch, 24 feet (7.3 meters) from southwest corner of cricket pitch. True bearings: top left-hand corner of fifth post from corner of post and wire fence enclosing reserve on south, 3° 05′.7; spike on north end of hut, 299° 29′.2; spike on south end of hut, 316° 29′.2.

Lillipilli, New South Wales, 1943.--On property owned by Mr. Whitehead near Cronulla, 90 paces (about 80 meters) south of eastern stone gatepost at entrance to property, 34 paces (about 31 meters) east of fence along private road, and 25 paces (about 23 meters) north of paddock fence; marked by a 3 by 2 inch (8 by 5 centimeter) hardwood peg driven flush with ground. True bearings: nail in gum tree, 36.3 feet (11.06 meters), 34° 16′.9; stone gatepost, 171° 03′.4; north edge of chimney at end of large stone house on opposite foreshore, 1.75 miles (2.8 kilometers), 301° 46′.1.

Lolworth Goldfield, Queensland, 1940.--On open ground about 650 feet (198 meters) southeast of Midas Mine, about 1000 feet (305 meters) north of Mons Meg Mine, 169.7 feet (51.72 meters) from a survey peg marking southwest corner of mining lease No. 2593, and 174.3 feet (53.13 meters) from a survey reference mark on an ironbark tree; marked by a 3 by 3 inch (7.5 by 7.5 centimeter) hardwood peg sunk flush with surface of ground. True bearings: survey reference mark on ironbark tree, 9° 33′.2; tree to south, 5° 04′.6; survey peg at southwest corner of mining lease No. 2593, 20° 43′.3.

Longford, Tasmania, 1936.--Close reoccupation of CIW station of 1923, 10.5 feet (3.20 meters) west of center of gravel path leading from entrance gate towards south end of sports oval, 192.6 feet (58.70 meters) south of south corner of dressing shed, and 190.2 feet (57.97 meters) southwest of fence corner near entrance gate; marked by a 2 by 2 inch (5 by 5 centimeter) peg left 1 inch (2.5 centimeters) below surface of ground. True bearings: near corner of sports dressing shed, 187° 16′.7; corner post of fence near entrance gate, 214° 05′.3; base of weather vane on Longford Old Church, 254°.04′.0; near corner of almshouse, 286° 54′.2; center veranda post on cottage seen through trees, 346° 49′.5.

Longreach, Queensland, 1936.-- Close reoccupation of CIW station of 1913, on the recreation and show ground reserve, 284.3 feet (86.65 meters) from the northeast fence of the reserve measured at right angles from the 44th post from the north corner, 337.9 feet (102.99 meters) from the northwest fence measured at right angles from the 37th post from the north corner and approximately 440 feet (400 meters) almost due south from the north corner post; marked by a 2 by 2 inch (5 by 5 centimeter) peg left 1 inch (2.5 centimeters) aboveground. True bearings: base of flagpole on Commercial Hotel, 3° 09′.9; cross on center gable in front of convent, 14° 07′.5; ornament on right end of roof of grandstand, 29° 45′.5; north corner post of recreation reserve, 177° 59′.0; top of right-hand tower of radio station 4LC, 268° 04′.7; east corner post of recreation reserve, 274° 46′.1.

Maitland, South Australia, 1936.-- Within the oval of the show ground of the Maitland Agricultural, Horticultural, and Floricultural Society situated in the north central part of the town; in line with the eastern edge of the cricket pitch, near the center of the oval, 41.0 feet (12.50 meters) and 41.7 feet (12.70 meters), respectively, from the southeast and southwest corners of the southern end of the pitch; marked by a round aluminum peg set just below the surface. True bearings: lowered gable end of house to south-southwest, 11° 50′.6; apex of rear face of small belfry tower of church, 68° 59′.1; apex of Soldier's Memorial Monument, 89° 15′.3; apex of gable with central louvred panel of house to north-northwest, 168° 25′.1; top center of ornament on north tower of pavilion, 274° 23′.7.

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Maryborough, Queensland, 1936.--A close reoccupation of CIW station of 1913, in the south corner of the military camping reserve bound by Gayndah and Rocky Streets, 267 feet (81.38 meters) from the south corner post of reserve, and 180.5 feet (55.02 meters) from southeast boundary fence; marked by 2 by 2 inch (5 by 5 centimeter) hardwood peg left flush with surface. True bearings: ornament on house beyond golf course, 66° 15′.3; north gable end of school building, 116° 34′.1; left-hand wireless mast of station 4MB, 165° 58′.9; right edge of elevated concrete tank, 180° 20′.9; north corner post of reserve at railway viaduct, 231° 15′.3; right edge of white smokestack at powerhouse, 281° 08′.7; center of right-hand tower on building in show grounds, 307° 20′.7; south corner post of reserve, 356° 52′.1.

Merredin, Western Australia, 1936, 1944.--Two stations were occupied. Station A was a close reoccupation of CIW station of 1936 which was an exact reoccupation of CIW station of 1912 and 1916, near the west end of catchment dam northeast of the town near the large granite outcrop, 137 feet (41.8 meters) northwest of the northwest corner of the fence surrounding the dam, and 86.8 feet (26.46 meters) west of the line of fence running south from the above-mentioned corner; marked with a small peg. True bearings: flagpole on brewery, 7° 32′.2; right-hand post of sluice-gate at north end of channel to dam, 213° 43′.0; right-hand edge of stone bridge at south end of channel to dam, 298° 46′.4; corner post of fence around dam, 319° 28′.1.

Station C was established with the view of securing a better secular-variation station because A is magnetically disturbed owing to the proximity of granite rocks containing crystals of magnetite. On recreation and sports ground in the northern part of town, 37 feet (11.3 meters) outside the cycle track, 197.0 feet (60.05 meters) from the south boundary of the recreation ground, 71.0 feet (21.64 meters) east of the line of east side of Duff Street, 518.8 feet (158.13 meters) from southeast corner of south buttress on east wall of Exhibition Hall, and 114.5 feet (34.90 meters) north of fence running round to grandstand; marked with a concrete block 12 inches (30 centimeters) long, and 4 inches (10 centimeters) in diameter at top with a brass screw set in the top and sunk flush with ground surface. True bearings: flagpole on Town Hall, 29° 22′.8; south gable end of roof on Exhibition Hall, 107° 06′.0; west gable on roof of golf clubhouse, 222° 39′.6; left edge of tank on top of rock, 240° 20′.2; flagpole on brewery, 332° 12′.0.

Mildura, New South Wales, 1944.--Approximate reoccupation of CIW station of 1911, north of Recreation Grounds on cricket field at the corner of 11th Street and San Mateo Avenue, south of and in line with the east side of the cricket pitch, 73.8 feet (22.49 meters) south of the southeast corner of the cricket pitch, 232.5 feet (70.87 meters) west of 11th Street, and 453.8 feet (138.32 meters) south of San Mateo Avenue; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at the top, sunk flush with ground surface, a brass screw set in the top indicating the exact spot. True bearings: ornament at north gable end of cottage, 37° 23′.7; ornament on school belfry, 109° 59′.0; steeple on Presbyterian Church, 138° 32′.6; flagpole on Town Hall tower, 174° 07′.6; near flagpole on grandstand in Recreation Grounds, 333° 25′.7.

Moree, New South Wales, 1936, 1944.--As the station of 1913 was no longer suitable for occupation, a new station was established in 1936 and exactly reoccupied in 1944 about 900 feet (275 meters) to the southwest, in line with the north fence of the camping reserve between Albert Street and Gwyder River, 140.0 feet (42.67 meters) west of the northwest corner post of camping reserve; marked by a 2 by 2 inch (5 by 5 centimeter) hardwood peg left flush with ground. True bearings: windmill, 0.50 mile (0.8 kilometer), 11° 18′.0; near corner of chimney on building in cemetery, 107° 11′.3; base of flagpole on Church of England, 209° 22′.3; near gable end of pavilion in sports ground, 237° 18′.3; tower on school, 252° 51′.0; cross above window on west wall of Catholic Church, 297° 12′.9.

Moruya, New South Wales, 1936.--Close reoccupation of CIW 1913 station, in northeast corner of racecourse reserve, 153.5 feet (46.8 meters) from north fence, and 266.8 feet (81.3 meters) from north end of bridge across road to east; marked by 2 by 2 inch (5 by 5 centimeter) hardwood peg driven flush with surface. True bearings: right edge of elevated tank at house to south, 27° 31′.5; near gable end of grandstand roof, 58° 42′.0; cross on east gable of Catholic Church, 144° 39′.8; roof above right dormer window on Moruya (late Keating's) Hotel, 148° 17′.7; northwest corner post of fence around house to east, 282° 03′.0.

Mount Yokine, Perth, Western Australia, 1944.-- On the Mt. Yokine golf links, about 275 yards (250 meters) south of and directly opposite the front entrance to the clubhouse, about 50 feet (15 meters) east of a lemon tree, 184.7 feet (56.30 meters) north of south boundary of golf links, 295.7 feet (90.13 meters) northeast of the northeast corner of the machinery shed, 192.5 feet (58.67 meters) southwest of the near corner of small refreshment stand; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top and sunk slightly below ground surface, a brass screw set in the top indicating the exact spot. True bearings: spire on Roman Catholic Church at Hawthorn, 16° 56′.3; northeast corner of machinery shed, 57° 33′.5; steel mast at 6 KY radio station, 298° 02′.4.

Nairne, South Australia, 1934.-- Exact reoccupation of CIW station of 1918, in northeast corner of quarry reserve, on hill southeast of Nairne railway station and 13.13 chains (264.11 meters) south of center of main railway crossing; marked by survey mark consisting of concrete circle flush with ground, engraved "Geodetic and Magnetic Survey of South Australia" with crossarms pointing north-south, east-west, ϕ 35° 02′.4 S, λ 138° 54′.4 E. True bearings: spike on gable of two-story house near railway crossing, 0.25 mile (0.4 kilometer), 197° 58′.1; gable ornament on west side of house on a slope, 0.75 mile (1.2 kilometer), 272° 21′.9; rod on northeast gable of church, 0.25 mile (0.4 kilometer), 279° 59′.9.

Newcastle Waters, Northern Territory, 1937.--Close reoccupation of CIW station of 1912, in stockyard south of railway station, 31.5 feet (9.60 meters) northeast of lone gutta-percha tree in line with station quarters; marked by a peg. True bearings: right support post for meat gallows, 95° 27′.3; left gatepost near northwest corner of stockyard, 151° 05′.3; fence post, 304° 29′.9.

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Norseman, Western Australia, 1938.--Close reoccupation of CIW station of 1912, near center of tract of land reserved for warden's quarters near shore of Lake Cowan, about 175 yards (160 meters) from lake shore, about 305 feet (93 meters) south of north boundary of warden's reserve, about 426 feet (130 meters) from northeast corner of same, about 360 feet (110 meters) from south boundary of same, and 39.6 feet (12.07 meters) east of line of west side of Douglas Street; marked with a 2 by 2 inch (5 by 5 centimeter) hardwood peg flush with ground. True bearings: a tree stump, 11° 17'.8; stack at Butterfly Mine, 281° 24'.9.

Port Augusta, South Australia, 1936, 1944.--Two stations were occupied. Station A was an exact reoccupation of CIW station of 1914, on small sand hill west of cricket ground, east of Port Augusta Railway Station, 165.3 feet (50.38 meters) from fenced western boundary of the parklands, and 103.2 feet (31.45 meters) west of a valve on buried water-main line; marked by an earthenware pipe 6 inches (15 centimeters) in diameter. True bearings: top of most easterly of two elevated water tanks, 10° 05'.2; tower on Town Hall, 108° 02'.0; cross on Cathedral, 162° 03'.6; east corner of stonework on Pastoral Hotel, 349° 44'.6.

Station C was established because local authorities advised that a new school and other buildings were to be erected at an early date on land adjacent to this station. The new station, Port Augusta C was established in 1944. In open field to west of Port Augusta jail, east of side road leading towards racecourse, 622.4 feet (189.71 meters) west of northwest corner of jail wall, 603.4 feet (183.92 meters) west-northwest of southwest corner of jail wall, 400.6 feet (122.10 meters) north-northwest of southwest corner of open field, and 282 feet (86 meters) east of post at bend in side road; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top, sunk flush with ground surface, a brass screw set in top indicating the exact spot. True bearings: southwest corner post of open field, 29° 48'.8; east gable of stone house, 1000 feet (305 meters), 32° 05'.7; post at bend in side road, 100° 09'.1; cross on Cathedral, 118° 55'.3; flagpole on racecourse grandstand, 151° 56'.7; left edge of concrete water tank, 240° 36'.2; northwest corner of jail wall, 272° 24'.7; southwest corner of jail wall, 291° 15'.0; windmill, 0.50 mile (0.8 kilometer), 347° 19'.2.

Port Hedland, 1938, 1944.--Proximate reoccupation of CIW station of 1921, on cricket ground south of road leading from town to railway sheds and aerodrome, in line with west fence around Vacuum Oil Depot, and about 400 feet (122 meters) from southeast corner of this fence; not marked. True bearings: top of mast at signal station, 58° 42'.8; near gable end of church, 86° 54'.3; left gable end of Vacuum Oil Store, 178° 51'.9; right edge of tank at railway sheds, 273° 01'.9.

Portland, Victoria, 1936.--Exact reoccupation of CIW station of 1912, in public reserve between coast line and Bentick Street, 210.5 feet (64.16 meters) from south end and 241 feet (73.46 meters) from north end of stone wall in front of Portland Hospital; marked by wooden peg driven about 1 inch (2.5 centimeters) below surface of ground. True bearings: top of Roman Church steeple, 9° 55'.2; top right edge of right wing of hospital, 300 feet (104.4 meters), 112° 57'.8; center of weather vane over center of lighthouse, 203° 44'.9; mouth of old cannon at old lighthouse site across bay, 327° 22'.1.

Port Lincoln, South Australia, 1944.--Two stations were occupied. Station A was a close reoccupation of CIW station of 1911 and 1923, and an exact reoccupation of South Australian Magnetic Survey station of 1928 and 1939, in small block southeast of the Centenary Oval, and northwest of school grounds; marked by an earthenware pipe filled with concrete. True bearings: cross at front of Roman Catholic Church, 0° 23'.1; cross at rear of the same church, 2° 16'.3; ornament on front of Baptist Church, 220° 24'.1; Flinder's monument, 309° 31'.5.

Station B was in southwest part of Centenary Oval, 176.3 feet (53.74 meters) northwest of center of western concrete post of gateway on south side of oval, 131.8 feet (40.17 meters) east of thick concrete post of inner fence around oval, 113 feet (34.4 meters) east of picket fence at western boundary of oval, 272.7 feet (83.12 meters) southwest of thick concrete post of inner fence around oval near scoreboard, and 384.5 feet (117.20 meters) north of southwest corner picket-fence boundary of oval; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top, sunk 1 inch below ground surface, a brass screw in the top indicating the exact spot. True bearings: right-hand edge of old mill at top, 149° 17'.4; center of cross on Anglican Church, 244° 42'.3; ornament on north end of Methodist Church, 291° 09'.8.

Port Stephens, New South Wales, 1943.--On flat timbered area south of Shoal Bay Beach, 0.50 mile (0.8 kilometer) west of Shoal Bay Country Clubhouse, and about 400 feet (120 meters) south of road from Nelson's Bay; marked by bush peg about 2 feet (60 centimeters) long driven flush with ground. True bearings: Yacaaba trigonometric station, 2.5 miles (4 kilometers), 232° 58'.2; bolt in gum tree, 31.7 feet (9.66 meters), 311° 28'.4.

Port Victor, South Australia, 1934.--Exact reoccupation of CIW station of 1911, 1914, and 1924. On hill about 2 miles (3.2 kilometers) northwest of town in southeastern part of reserve known as Glassonbury's Quarry 103.5 feet (31.55 meters) from south fence and 136.5 feet (41.61 meters) from fence on east bordering main road; marked by aluminum pin 0.75 inch (1.9 centimeters) in diameter and 10 inches (25 centimeters) long driven through center of jarrah peg and covered with pile of stones. True bearings: west corner of small white house, 2 miles (3 kilometers), 236° 10'.0; highest chimney of Tower of Mount Bracken Club, 2 miles (3 kilometers), 262° 18'.8; flagpole on Granite Island, 2 miles (3 kilometers), 295° 46'.1; rear gable of church, 1 mile (1.5 kilometer), 320° 11'.7; first landward pile of small wharf at Rosetta Head, 3 miles (4.8 kilometers), 348° 08'.0.

Redbank, Northern Territory, 1940.--On flat ground about 350 feet (107 meters) north of the Redbank Copper Mine; marked by 3 by 3 inch (7.5 by 7.5 centimeter) hardwood peg. Mark used was a temporary stake.

Red Hill, New South Wales, 1936.--A close reoccupation of station A of 1913, 1916, and 1921, on ground at Pennant Hill formerly occupied by Red Hill branch of Sydney Observatory, at point about 5 feet (1.5 meters) north of group of pier foundations that stood in the magnetic observation hut which has since been removed, 4.6

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feet (1.4 meters) northeast of the northeast corner of the largest pier foundation, and 8 feet (2.4 meters) north by west of the most easterly pier foundation; marked by a 2 by 2 inch (5 by 5 centimeter) hardwood peg driven flush with surface of ground. True bearing: white line on stone pillar, 162.7 feet (49.6 meters), 251° 42'.4.

Rockhampton Downs, Northern Territory, 1939.--Just east of a fenced enclosure around the station house or residence, 254.0 feet (77.42 meters) from northeast corner of enclosure, 333.0 feet (101.50 meters) from southeast corner of same; marked by 3 by 3 inch (7.5 by 7.5 centimeter) hardwood peg sunk flush with surface of ground. True bearings: center of post at southeast corner of enclosure, 50° 15'.7; bore casing at windmill, 74° 20'.1; center of post at northeast corner of enclosure, 111° 24'.6; post to southward, 350° 47'.4.

Rockhampton, Queensland, 1936.--Exact reoccupation of CIW station of 1922, in the recreation-fields reserve on west side of Campbell Street opposite Victoria Park, 396.5 feet (120.85 meters) from post of railway fence at north corner of reserve, 42.0 feet (12.8 meters) and 44.5 feet (13.56 meters), respectively, northeast of sixteenth and seventeenth posts of railway right-of-way fence counted from north corner of reserve; marked by a hardwood peg 2 by 2 inches (5 by 5 centimeters) square. True bearings: ventilator on center of roof of jail, 13° 58'.4; right-hand edge of tower on hospital on hill, 36° 53'.5; pump plunger of left-hand windmill in show grounds, 117° 21'.4; right edge of railway post "35" at north corner of reserve, 153° 29'.3; right edge of smokestack near railway bridge at river, 261° 33'.3; railway post at east corner of reserve, 300° 38'.2; cross on west gable of Catholic Church, 313° 08'.7; top of railway signal pole, 322° 46'.4.

Roma, Queensland, 1936.-- An exact reoccupation of CIW magnetic station of 1913. The 1936 site was included in a reserve for a golf course, near south corner of golf course reserve at northwest end of Queen Street, 166.5 feet (50.75 meters) from corner post, and 23.5 feet (7.16 meters) from nearby gum tree; re-marked by a 2 by 2 inch (5 by 5 centimeter) hardwood peg left flush with the surface of ground. True bearings: left ornament on roof of hospital, 45° 24'.5; base of flagpole on roof of clubhouse, 89° 35'.5; ornament on center of roof of large house; 230° 51'.9; cross on Church of England, 300° 04'.6; turret on courthouse, 330° 08'.6; cross on tower above convent, 356° 46'.7.

Ryan's Well, Northern Territory, 1937.-- Close reoccupation of CIW station of 1912, about 300 yards (274 meters) east-southeast from Ryan's well, 388 feet (118.3 meters) from southeast corner of old stone cottage, 101.7 feet (31.00 meters) northwest of a Mulga tree, 235.8 feet (71.87 meters) northeast of the southwest corner of stockyard; marked by a peg. True bearing: top right edge of stone coping at well, 112° 14'.8.

Shark Island, Sydney Harbor, New South Wales, 1944.--Near a palm tree at northern tip of Shark Island; marked by a 3 by 3 inch (8 by 8 centimeter) peg projecting 4 inches (10 centimeters) aboveground. True bearings: church spire near city, 46° 07'.5; light tower near Shark Island, 167° 40'.9; flagpole on St. George's Heights, 181° 35'.0; trigonometric beacon on Vaucluse water tower, 284° 49'.9. Considerable disturbance due to electric cars.

Sorell, Tasmania, 1936.-- An approximate reoccupation of CIW station of 1923, about 2.5 miles (4 kilometers) east-northeast from the former location, in the southern end of the narrow park which was between Pelham Street and the creek, 46.9 feet (14.30 meters) from the center of the fence around a wicket gate at the foot of Sumerville Street measured at right angles to the picket fence, 116.9 feet (35.63 meters) from the southern boundary of the park measured from the point where the picket fence ended and a rail fence began; marked by 2 by 2 inch (5 by 5 centimeter) peg driven flush with the ground. True bearings: left edge of chimney on nearby cottage, 55° 15'.7; near gable end of Sorell Motor Garage, 112° 53'.8; cross on near gable end of church, 156° 27'.0; near gable end of tall wooden shed to northeast, 238° 43'.6; right gable end of large shed near inlet, 337° 00'.6.

Strathalbyn, South Australia, 1934.--In large open space toward western side of show grounds, almost in line with fourth post north of opening in post and rail fence surrounding oval, and extreme left-hand post at entrance gates; 88.5 feet (26.97 meters) from above fourth post, 57 feet (17.4 meters) from pine tree nearly in same line, 76.5 feet (23.3 meters) from next pine tree north, 142.2 feet (43.34 meters) from oval end of white picket fence alongside pavilion, in line with front corner post of pavilion and nearest pine tree north; marked by broken aluminum peg driven flush with ground. True bearings: right edge at top of white gate at entrance to other street, 125 yards (114 meters), 225° 29'.0; wooden spike on gable of house outside main gate, 250 yards (229 meters), 299° 08'.8; wooden spike at north end of shed south of stone building, 210 paces, 326° 09'.8.

Tambo, Queensland, 1936.--An exact reoccupation of CIW station of 1913, in southwest corner of reserve for dam at east end of Arthur Street (main), 169 feet (51.51 meters) from southwest corner post of reserve, and 78.5 feet (23.93 meters) from fence along southern boundary of reserve; marked by hardwood peg sunk just below surface of ground. True bearings: gauge on elevated tank over bore, 14° 03'.2; top of Barry Monument, 200 feet (61 meters), 24° 47'.7; ornament on rear gable end of Forrester's Hall, 71° 22'.1; base of pole supporting wind indicator at aerodrome, 166° 08'.9; southeast corner post of reserve, 261° 11'.7; near gable of building at Tambo station, 283° 26'.1; near gable of large iron woolshed at Tambo station, 286° 01'.7.

Taylor's Crossing, 1937.--Close reoccupation of CIW station of 1912, across Taylor River northward from a well which was near point where the overland telegraph line crosses river, 557.3 feet (169.86 meters) south by west from the 121 meter peg which is 4 feet (1.2 meters) east of the telegraph pole at the bend in the line, 200 feet (61 meters) nearly south of the second telegraph pole from the pole at the turn of the line; marked by heavy peg. True bearing: 121 meter peg, 211° 26'.8.

Tennant's Creek, Northern Territory, 1936, 1939, 1940.--The 1936 occupation was a close reoccupation and the 1939 and 1940 occupations were exact reoccupations of CIW station of 1912; near bank of Tennant's Creek, 216.8 feet (66.08 meters) from northeast corner of garden plot, 194 feet (59.1 meters) from well within the garden enclosure, 92.6 feet (28.22 meters) from a gum tree to

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southwest, and 51.0 feet (15.54 meters) from a larger gum tree nearly due south; marked by a 3 by 3 inch (7.5 by 7.5 centimeter) hardwood peg flush with surface of ground. True bearings: spike in gum tree, 38° 14′.6; center of northeast corner post of garden fence, 92° 14′.2; left edge of chimney on old telegraph office, 119° 12′.2.

Tenterfield, New South Wales, 1944.--Close reoccupation of CIW station of 1913 and 1922, in Tenterfield Golf Park near southeast corner of Derby and Bulwer Streets, 320 feet (97.5 meters) from fence post at northwest corner of Golf Park, and 98 feet (29.9 meters) from west fence of Golf Park; marked by a 3 by 3 inch (8 by 8 centimeter) hardwood post flush with ground surface. True bearings: trigonometrical-survey beacon on hill west of town, 103° 04′.1; center of right gable of two center gables of railway station, 124° 08′.5; ornament on turret of Mr. Ried's house, 145° 42′.5; fence post at northwest corner of Golf Park, 171° 49′.6.

Thomson's Rockhole, Northern Territory, 1939.--On flat ground, 543 feet (165.5 meters) almost due south of Thomson's Rockhole; marked by a 3 by 3 inch (7.5 by 7.5 centimeter) bush peg sunk flush with surface of ground. True bearing: a tree to the south, 12° 53′.8; approximate center of rockhole, 179° 11′.6.

Toolangi, Victoria, 1936.--Observations were made with CIW magnetometer inductor No. 28 on the regular instrument piers of the absolute building and comparisons with observatory standards obtained by means of simultaneous values as derived from the magnetograms controlled by special observations for base lines and scale values. True bearings: white mark on tree (observatory mark from magnetometer pier), 204° 14′.6.

Toowoomba, Queensland, 1936.--An exact reoccupation of CIW station of 1913, near center of Queen's Park, 177.0 feet (53.95 meters) southwest from lamppost which stood near concrete slab which marked the location of wooden gate in wire fence mentioned in the description of the 1913 station, 168.8 feet (51.45 meters), north-northwest from corner post of fence enclosing basketball court; marked by a new hardwood peg replacing the old one which was badly decomposed. True bearings: pole on tower on Technical College, 42° 34′.8; spire on Church of Christ, 64° 19′.3; right-hand edge, at ground, of near lamppost, 216° 46′.0; near corner of fence around Botanic Gardens, 252° 06′.6; near corner of fence around basketball reserve, 345° 04′.6.

Townsville, Queensland, 1936.--Close reoccupation of CIW station of 1912 and 1913, on military reserve in a section used as a parade and cricket ground, behind the fort at Kissing Point, on the northwesterly projection of Mitchell Street, 42.6 feet (12.98 meters) south of the south corner and 97.1 feet (29.60 meters) from the west corner of the concrete cricket pitch, and 223.9 feet (68.24 meters) from near corner of fence around military store and quarters; marked by a peg left 1 inch (2.5 centimeters) below surface. True bearings: ventilator on main building of orphanage, 3° 40′.7; right ventilator on Bishop's palace, 48° 48′.7; ventilator over center of fort, 203° 48′.4; near gable end of military store, 286° 39′.1; spire of Anglican Cathedral, 320° 27′.9.

Watheroo, Western Australia, 1927-1944.--Declination and horizontal intensity observations were made weekly in the absolute building on pier N_m with magnetometer No. 7, and inclination observations, on pier N_w with inductor No. 2, for control of the Eschenhagen magnetograph during the years 1927 to 1944. Additional observations were obtained during intercomparisons or standardizations of the observatory magnetometer and earth inductor on piers N_m and S_m in the years 1935, 1936, 1938, and 1940, and on piers N_w and S_w in the years 1936, 1938, and 1940. True bearings: from pier N_m the mark on azimuth pillar E bears 265° 21′.4; and from pier S_m, the same mark bears 264° 26′.7.

Wellington, New South Wales, 1936, 1944.--Station of 1923 no longer suitable, therefore new station established less than 50 yards (46 meters) distant, on racecourse reserve about 1 mile (1.6 kilometer) due west of Wellington post office, in line with eastern end of new grandstand, 421.3 feet (128.49 meters) from the southeast corner of stand, and 132.8 feet (40.50 meters) north of near corner of jumping barricade which was practically in line with the magnetic station and southeast corner of grandstand; marked by a 2 by 2 inch (5 by 5 centimeter) hardwood peg driven flush with surface. True bearings: left edge of tank near windmill, 52° 44′.9; right gable end of house on hill, 99° 00′.6; left end of top of roof of grandstand, 179° 19′.3; spire on Roman Catholic Cathedral, 241° 30′.5; left edge of left tank on hill, 276° 43′.2; cross on iron building in cemetery, 339° 37′.8. Close reoccupation in 1944 of new station marked by a 3 by 3 inch (8 by 8 centimeter) hardwood peg flush with ground surface. True bearings: left edge of tank near windmill, 52° 57′.8; right gable end of house on hill, 99° 00′.9; left end of top of roof of grandstand, 178° 56′.6; spire on Roman Catholic Cathedral, 241° 29′.4; left edge of left tank on hill, 276° 21′.9; cross on iron building in cemetary, 339° 48′.3.

Werris Creek, New South Wales, 1936, 1944.--The site of the 1913 and 1922 station no longer being suitable, a new station was established in 1936 and exactly reoccupied in 1944 on the grounds of the new Werris Creek District Hospital about 0.2 mile (320 meters) to the northwest of the old station, about 0.3 mile (480 meters) east of railway, on north side of North Street on brow of hill, 129.9 feet (39.59 meters) north of south fence of hospital grounds, in line with telegraph poles along west side of Punjarra Street, and 58.8 feet (17.92 meters) from east fence of grounds; marked by a 2 by 2 inch (5 by 5 centimeter) peg set flush with ground. True bearings: cross on north gable of Catholic Church, 28° 46′.5; near gable end of stationmaster's house, 85° 30′.1; near gable end of stable to right of near hill, 214° 39′.9; windmill near tank under brow of far hill, 258° 20′.8; left edge of tank under brow of far hill, 271° 27′.9; chimney of stables under brow of hill, 340° 32′.6.

Wilcannia, New South Wales, 1944.--The station of 1913 and 1923 was no longer suitable owing to the presence of a water-pipe line. A new station was established about 130 yards (119 meters) to the north-northwest, in Bourke Park on west side of town, in line with northern end of cricket pitch, 100.4 feet (30.51 meters) east of the northeast corner of cricket pitch, 119.7 feet (36.48 meters) northeast of southeast corner of cricket pitch,

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365.0 feet (111.25 meters) southwest of the northeast corner of Bourke Park, and 409.3 feet (124.75 meters) northwest of the southeast corner of Bourke Park; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top, set flush with ground surface, a brass screw set in top indicating exact spot. True bearings: ornament at front gable end of long galvanized iron building, 15° 24′.6; near gable end of large building, about 1.5 mile (2.4 kilometers), 67° 01′.3; cross on front of Roman Catholic Church, 253° 11′.2; near cross on Anglican Church, 293° 57′.1; spire on far gable end of stone building, about 250 yards (230 meters), 349° 23′.1.

Winton, Queensland, 1939.--Exact reoccupation of CIW station of 1913, in southwest corner of sports ground reserve, 100.6 feet (30.66 meters) from the southwest corner post of the reserve and 70.8 feet (21.58 meters) measured at right angles, from the south fence of the reserve; marked by 2 by 2 inch (5 by 5 centimeter) hardwood peg sunk flush with surface. True bearings: cross on church, 117° 14′.6; right-hand ornament on church, 126° 47′.0; spire on south gable of grandstand, 186° 57′.0.

Woolgoolga, New South Wales, 1936, 1944.--Practical reoccupation of CIW station of 1913, west-northwest of Seaview Hotel, on south side of road leading to Upper Woolgoolga, 43 feet (13.1 meters) from middle of road, in line with a fence running north-south to south of station, 85.3 feet (26.02 meters) north of corner post of this fence, 42.8 feet (13.04 meters) northwest of a large dead tree, 75.6 feet (23.04 meters) southwest of near telegraph pole, and 123.5 feet (37.64 meters) southeast of another telegraph pole; marked by a 3 by 3 inch (8 by 8 centimeter) hardwood peg flush with ground. True bearings: near top corner of red roof of house, 136° 05′.5; left edge at ground of signpost on Crafton Road, 208° 06′.5; near top corner of roof of house, 248° 52′.6; top angle of danger sign near shore, 273° 49′.0; ornament on front of Seaview Hotel, 285° 24′.6; front of gable on post office, 258° 42′.6.

Yalata Head, South Australia, 1934, 1944.--Close reoccupation of CIW station of 1923, on open ground south of the station house (unoccupied in 1944), 289.5 feet (88.24 meters) from the corner of the garden wall in line with the east side of the station house; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top, projecting 4 inches aboveground and piled around with stones, a brass screw set in top indicating exact point. True bearings: windmill center, about 0.25 mile (0.4 kilometer), 50° 48′.7; southwest corner of old stone buildings or sheds, 131° 19′.4; ornament on gable of station house, 152° 54′.0; east corner of wall around most eastern cemetery, 221° 32′.9.

Yorketown, South Australia, 1936.--Exact reoccupation of CIW station of 1924, in southwest corner of Memorial Recreation Ground, 92.8 feet (28.29 meters) from a notched post of the inner southern fence and 94.5 feet (28.80 meters) from a notched post of inner western fence. These notched posts are 169.0 feet (51.51 meters) and 171.4 feet (52.24 meters), respectively, from the post at the southwestern corner of the enclosure. True bearings: ornament on east gable of farmhouse to south, 700 feet (213 meters), 0° 17′.9; cross on church tower, 900 feet (275 meters), 120° 35′.5; near gable of pavilion, 250 feet (76 meters), 189° 59′.7; north edge of stone outbuilding within oval, 300 feet (91 meters), 247° 30′.2.

Yunta, South Australia, 1944.--Approximate reoccupation of CIW station of 1911 and exact reoccupation of South Australian Magnetic Survey station of 1930, on open paddock south of railway yards, 173.8 feet (52.97 meters) south of railway fence, and 254.7 feet (77.63 meters) southeast of southeast corner of most easterly of four railway cottages; marked by a concrete block 12 inches (30 centimeters) long and 4 inches (10 centimeters) in diameter at top, sunk flush with ground surface, a brass screw set in top indicating exact spot. True bearings: center of headstone in cemetery, 5° 01′.7; signal post to west of railway station, 64° 49′.8; southeast corner of Yunta Hotel, 161° 39′.7; trigonometric survey beacon, 193° 18′.8; signal post to east of railway station, 229° 32′.8.

New Zealand

Amberley, Christchurch, 1936, 1937.--Intercomparison observations were made in the absolute building of the Christchurch observatory at Amberley, about 30 miles due north of Christchurch. Declination and horizontal intensity were observed on the east pier and inclination on the west pier. Observatory azimuth of declination mark, 129° 49′.6.

Auckland, (Domain), 1937.--Close reoccupation of CIW station of 1922, near highest point of Domain, behind and south of the Museum and north of a trigonometrical mark surmounting the "Transit-of-Venus" pier, 99.3 feet (30.27 meters) from hole in top of Transit-of-Venus pier, and 2 feet (0.6 meter) east of line joining pier and the door of administration office of museum; marked by a 2 by 3 inch (5 by 8 centimeter) wooden peg set level with the surface. True bearings: triangulation mark on Mount Eden, 32° 47′.3; flagstaff on church to right of winter garden building, 131° 31′.4; triangulation mark on mountain on Rangitoto Island, 221° 08′.9; triangulation mark on One-tree-hill, 353° 20′.3.

Auckland (Hobsonville), 1937.--At extreme eastern end of Hobsonville aerodrome, in front of residence of commanding officer and due south of seaplane hangar, 83.2 feet (25.36 meters) from nearest point of fence around the residence, 129.5 feet (39.47 meters) from fence along road measured toward seaplane hangar, 172.5 feet (52.59 meters) from a survey peg which was on the road just north of gate to commanding officer's residence; marked by concrete block set flush with surface of ground. True bearings: top of wireless tower of station 1YA, 30° 44′.1; flagpole on front of No. 1 hangar, 109° 06′.2; top of anemometer tower, 125° 01′.5; left-hand edge of mast of wind indicator on seaplane hangar, 181° 04′.7; cable mark across water, 269° 18′.3.

Te Awamutu, 1937.--Proximate reoccupation of CIW station of 1916, about 0.25 mile (0.4 kilometer) northeast of post office at the northwestern end of the sports ground, just inside cycle track on projected line joining the two northern goal posts on football field, and 103 feet (31.4 meters) northeast of nearer goal post; marked by a 3 by 3 inch (8 by 8 centimeter) peg left just below surface. True bearings: near gable on house to south, 5° 07′.9; base of flagpole on nearer end of grandstand, 19° 31′.7;

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standard survey block near entrance gate, 55° 37'.3; base of mast on Empire Theater, 76° 04'.1; center of east face of clock on post office, 88° 35'.1; top of spire on Anglican Church, 132° 07'.7; left edge of chimney on house to southeast, 288° 26'.9.

Clinton, 1936.--Three stations were occupied. Station A was close reoccupation of CIW station of 1916 and 1922, near center of small triangular paddock behind police station, 65.3 feet (19.91 meters) from a hedge joining eastern boundary of paddock, 82.0 feet (24.99 meters) northeast of a fence where it joined eastern boundary of paddock. True bearings: north corner of brick house, 12° 32'.9; front gable on brick house, 17° 01'.8; near corner of chimney on side of cottage to west, 102° 29'.1; left sash of window on engine house, 159° 10'.3; right gable of rear of Grand Hotel, 278° 00'.9.

Station B, established as a test for local disturbance, was 61.9 feet (18.62 meters) southwest of A, and in line with north corner of brick house.

Station C was near top of rising ground beyond stockyards and south-southeast of A. True bearing: near gable of engine shed, 162° 33'.5.

Eketahuna, North Island, 1937.--Practical reoccupation of CIW station of 1916 and 1922, near center of northern half of domain, over a survey peg in line with northern side of sports pavilion, 210 feet (64.0 meters) from northeastern corner of pavilion; marked by same survey peg. True bearing: right-hand gatepost at entrance to domain, 4° 38'.7.

Kingston, 1936.--Close reoccupation of CIW station of 1916 and 1922, in open space about 600 feet (183 meters) south of hotel, 84.5 feet (25.75 meters) south of corner post of fence in front of cowshed, 59 feet (18 meters) from southeast line of fence, 60.4 feet (18.41 meters) from a road survey peg 66 feet (20.1 meters) southeast from corner post; marked by 2 by 3 inch (5 by 8 centimeter) wooden peg set flush with surface. True bearings: left edge of center chimney on hotel, 174° 47'.3; right edge of shed on foreshore across lake, 214° 46'.9; left edge of large concrete shed across lake, 281° 50'.3; large cross in cemetery, 302° 39'.5.

Napier, 1937.--At southwestern end of McLean Park, a sports ground about 1.5 mile (2.4 kilometers) south of the center of town, 149.7 feet (45.63 meters) from southwest boundary fence, and 230.4 feet (70.23 meters) from southeast boundary fence; marked by a 3 by 2 inch (8 by 5 centimeter) wooden peg set just below surface of ground. True bearings: right edge of water tank at hospital, 141° 35'.3; front gable on house to left of grandstand, 159° 16'.1; bottom center of light standard at railway yard, 201° 04'.1; left edge of roof of eastern grandstand, 254° 18'.1.

Opotiki, 1937.--At eastern end of sports ground which was about 0.50 mile (0.8 kilometer) north of the center of the town, 55.5 feet (16.9 meters) from near post of gate in eastern boundary of ground, 96.5 feet (17.1 meters) from near end of fence which runs in front of grandstand; marked by a 3 by 3 inch (7.5 by 7.5 centimeter) wooden peg left just below surface of ground. True bearings: right edge of roof on grandstand, 68° 05'.5; front gable on shed behind entrance gate, 79° 45'.2; right-hand edge of chimney on house facing Church Street, 117° 42'.8; near gable of low shed to east, 275° 25'.2.

Queenstown, 1937.--Practical reoccupation of CIW station of 1922, about 1 mile (1.6 kilometer) east of town along lake front, 45 feet (13.7 meters) north of center of Peninsular Street, 46.8 feet (14.26 meters) and 50.4 feet (15.36 meters), respectively, from the nearest point and from the southeast corner of a fence about a pine-plantation westward across Adelaide Street; marked by 2 by 3 inch (5 by 8 centimeter) wooden peg set flush with surface. True bearings: highest point of left-hand mountain across lake, 20° 54'.8; highest point of right-hand mountain across lake, 39° 25'.1; northeast gable on house about 600 feet (183 meters), 93° 18'.4; near gable of slaughterhouse, 270° 49'.9; near gable on lone shed across lake, 307° 54'.5.

Rotorua, 1937.--Practical reoccupation of CIW stations of 1916 and 1922, about 0.33 mile (0.5 kilometer) south of site of 1916 station, on a reserve owned by the local authorities, west of a private road which leads from Arawa Road to the hospital, about 200 yards (183 meters) from Arawa Road, 289 feet (88.1 meters) from the southeast corner post of reserve, and 187 feet (57.0 meters) from near corner of concrete trough which was in northeast corner of reserve; marked by a 2 by 3.25 inch (5 by 8 centimeter) wooden peg left level with the surface. True bearings: front gable of Iwart's Hotel in valley, 87° 37'.6; left edge of stand over tank at Texaco Depot, 122° 44'.6; right edge of concrete trough near fence, 253° 46'.4; base of flagpole on post office, 288° 37'.2; left edge of chimney on schoolmaster's house, 337° 01'.7.

Roxburgh, South Island, 1937.--Practical reoccupation of CIW station of 1922, near southeast corner of the sports ground which was immediately south of the domain, 228 feet (69.5 meters) south of southwest veranda post of pavilion and in line with veranda posts on west side of pavilion and 68.5 feet (20.88 meters) from south end of wire fence running north and south between playing area and pavilion; marked by a 2 by 3 inch (5 by 8 centimeter) peg set flush with surface. True bearings: east gable of house to north, 161° 35'.8; peak of roof of pavilion on sports ground, 178° 53'.2.

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Germany

Hamburg, Finkenwarder Island, 1928.--Two stations, A and B, were established about 5 nautical miles (9.3 kilometers) west, on the Elbe River, from the anchorage of the Carnegie at Jonas Dock, Vorsetzen, Hamburg Harbor; on north shore of the island 200 yards (183 meters) west of the most westerly of four canals, a grass-covered sandy area sloping very gently to the river which was about 1000 yards (900 meters) distant, 100 yards (90 meters) north of a road running east and west with stone and brick houses on south side of the road, 1100 yards (1000 meters) west of a ship-building plant; not marked. True bearings: lighthouse, Tinsdahl, 294°; church spire, Blankenese, 321°; church spire, Nienstedten, 353°. Bearings taken from Hydrographic Office Chart No. 4909.

Station B was 50 feet (15.2 meters) east of station A.

Niemegk Observatory, 1935.--All observations were made on Pier 5, 9.6 centimeters north of the middle

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point of the south edge of the octagonal-topped pier. The mark used was a water tank, 1.3 kilometer distant, bearing 271° 01'.4 west of true south.

Seddin Observatory, 1928.--Observations were made on the standard piers in the absolute observatory. The pier used for declination and horizontal intensity was at the south end of the room and the pier for inclination at the north end. The mark used was fixed to the wall of the office and caretaker's house about 350 feet (107 meters) from the absolute house.

Great Britain

Abinger Observatory, 1935.--Observations were made in the absolute observatory, and results were compared with observatory values as derived from the magnetograph records.

Norway

Arctic Ocean, 1931.--On ice in latitude 81° 40' N and longitude 24° 45' E. Owing to movement of ice, only partial sets of inclination and total intensity were obtained.

Dombaas, Dovre, 1931.--Two stations were occupied. Station A was on the farm of Sigurd Einbu, called Brennoygarden, located about 1 mile (1.6 kilometer) due west of the Dombaas Touristhotel, reached by narrow unimproved road, down the slope from the hotel toward the Laagen River. The station was the pier of the newly built absolute house at Brennoygarden. True bearings: cairn on Veslefjellet (Little Mountain), 159° 08'.2; station B, 268° 45'.8.

Station B was located in the meadow 278 feet (84.7 meters) east of the pier in the absolute house and 10 feet (3 meters) north of the wooden fence along the southern boundary of the meadow; not marked. True bearings: pier in absolute house, 88° 45'.8; east gable on absolute house, 88° 46'.8; cairn on Veslefjellet, 2.5 miles (4 kilometers), 157° 59'.3.

Hop, Fana, 1931.--Two stations were occupied. Station A was near the northwest corner of Flatoen (Flat Island) located in a Fiord called Nordaas Vand in a southwesterly direction from the railway station at Hop; marked by a native boulder about 1 foot (30 centimeters) square and 10 inches (25 centimeters) deep, set with top nearly flush with surface, a 0.6 inch (1.6 centimeter) brass plug driven into the boulder marking exact spot. True bearings: chimney on house at Gullstenen, 167° 02'.3; largest radio mast at Rundemanden, 192° 24'.8.

Station B was 40.4 feet (12.31 meters) southwest from A; marked by a native boulder about 1 foot (30 centimeters) square and 10 inches (25 centimeters) deep set nearly flush with the surface, a drill hole marking the exact spot. True bearing: largest mast at radio station at Rundemanden, 192° 28'.4.

Longyear City, Advent Bay, 1931.--On low floodflat near the bay, below the settlement and between the dock near the powerhouse and the football field; marked by small cairn.

Oslo, Holmenkollen, 1929.--Northeast of Holmenkollen ski jump, on west shore of Lake Besserud, just south of stone wall leading across lake to small restaurant, on small prominent rock with just room enough for tripod. True bearing: edge of chimney of medicinal baths, 250 meters, 25° 42'.2.

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Alaska

Chichagof Harbor, Attu, 1934.--Exact reoccupation of U.S. Coast and Geodetic station of 1925, 119.7 feet (36.49 meters) almost due north of an observation pier nearly due west of the northwest corner of the schoolhouse. True bearing: center of observation pier, 1° 21'.3. Marked by U.S. Coast and Geodetic Survey bronze plate embedded in concrete.

College Observatory, 1941-1944.--Regular observations were made at the magnetometer pier in the absolute house of the magnetic observatory on the campus of the University of Alaska.

Point Barrow, 1932-1933.--The station was located about 100 yards (90 meters) southwest of the local Weather Bureau Office. True bearings: base of flagpole at old refuge station, about 1 mile (1.6 kilometer), 221° 18'.0; west cross section in south window of Weather Bureau Office, 233° 15'.6; west peak on schoolhouse, 244° 48'.5; highest steeple on the Mission Church, 253° 48'.0.

Canada

Agincourt Observatory, 1933.--Observations were made at the northeast and southwest piers in the absolute observatory.

Clyde River, Baffin Island, 1941.--Northeast of group of four houses composing Clyde River, 14 feet (4.3 meters) north and 104 feet (31.7 meters) east of the northeast corner of the northernmost house, and 293 feet (89.3 meters) from flagpole; marked by a brass plug in 0.50 inch (1.25 centimeter) drill hole in small embedded rock about 1 foot (30 centimeters) in diameter and surrounded by a ring of stones. True bearings: crotch to right side of harbor entrance as viewed from station, 17° 50'.2; right edge of flagpole, 50° 30'.1; highest peak southwest of station, 70° 59'.1.

Dundas Harbor, North Devon Island, 1941.--Two stations were occupied. Station A was 14.3 feet (4.36 meters), almost directly east, from the cairn near the extreme end of the east point of Dundas Harbor (not the harbor where Dundas Harbor Station is located, but the next harbor further west); marked by a drill hole about 1.5 inch (3.8 centimeters) deep, approximately in the center of an embedded rock 1 foot (30 centimeters) in diameter. True bearings: top point of small boulder on opposite point of harbor, 82° 59'.9; cairn on low hill to left, 254° 44'.1; left one of two cairns, 266° 28'.5; right one of two cairns, 267° 03'.7; cairn on hill with post, 288° 55'.3.

Station B was about 2 kilometers northeast of A, at the northern end of the next harbor to the east and just north of the police and Hudson Bay Company's buildings

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(at this time unoccupied). The magnetic station was over a bronze bench mark of the Dominion Magnetic Observatory, Ottawa, cemented into a small embedded rock, surrounded by a cairn, about 27 feet (8 meters) from a large boulder to the northwest, and 50 feet (15.2 meters) from another cairn near the cemetery. For further identification an "L.A.B." (Louise A. Boyd) brass marker was cemented into another embedded rock about 22 feet (6.7 meters) south of the magnetic station.

Fiord North of Cape Searle, Baffin Island, 1941.--Near upper end of an apparently uncharted fiord between 5 and 10 miles (8 and 16 kilometers) long, on a low flat peninsula about 1000 feet (300 meters) long projecting northward about 800 feet (240 meters) into the fiord from the southern wall of the fiord. The station was approximately 70 feet (21 meters) northeast of a large boulder located near the center and near the highest spot of the peninsula; marked by a 0.50 inch (1.25 centimeter) drill hole near the center of a flat embedded rock about 2 feet (60 centimeters) in diameter and surrounded by a cairn. True bearings: right-hand vertical edge of large boulder 70 feet southwest of station, 25° 42′.6; left side of boulder at upper end of fiord, 26° 59′.2; bottom end of almost vertical slope at peak of mountain at upper end of fiord, 27° 19′.0.

Fort Chimo, Quebec, 1943.--About 90 yards (80 meters) southeast of southeast corner of landing strip, southeast of line between two large boulders, 32 feet (9.8 meters) from the more northerly boulder and 50.5 feet (15.39 meters) from the second boulder; marked by a peg driven into the ground and covered by a small cairn. True bearing: notch in mountain to west, 80° 56′.6.

Grinnell River, Baffin Island, 1943.--On the east bank of Grinnell River which flows into the north side of Frobisher Bay near its head, about 50 yards (16 meters) from the east bank of the river, and about 20 yards (18 meters) north of the road used to haul water from the river; not marked. True bearing: knob of rock above notch up river from station, 150° 09′.6.

Pangnirtung, Baffin Island, 1941.--Reoccupation of a Dominion Observatory Magnetic Station, 20 feet (6.1 meters) south of path to doctor's house, and 86 feet (26.2 meters) east of the northeast corner of the same house; marked by a bronze bench mark set in whitewashed rock about 1.5 feet (0.45 meter) in diameter. True bearings: bottom of deep V-notch in rock profile to right of water as observer faced fiord entrance, 75° 30′.6; left-hand corner of rock at top of almost vertical wall of rock rising from the water as observer looked toward upper end of fiord, 206° 07′.1; a similar corner on the opposite side of the fiord, 212° 10′.6.

Payne Bay, Quebec, 1943.-- Northwest of Hudson's Bay Company factor's house, on level ground near ledge of rock, 57 feet (17.4 meters) south of bottom of ledge, and about 160 paces northwest of factor's house. True bearing: southwest corner of chimney on factor's house, 325° 27′.9.

Pond Inlet, Baffin Island, 1941.--Probably exact or close reoccupation of CIW station of 1922, on shore south of village, on south bank of second small stream from village, 78.7 feet (23.99 meters) from the center of a large boulder just off shore, 77.6 feet (23.65 meters) from a smaller boulder just south of the larger one, and approximately 1064 feet (325 meters) from the flagpole on the Hudson's Bay Company manager's house; marked by a bench mark inscribed "Dominion Lands Surveys, No. 1682, 1922" set in a red granite boulder about 2 feet (60 centimeters) in diameter near grass-line at beach and about 10 steps in from high-water line. True bearings: notch in wedge of rock extending down into glacier in mountain directly across inlet, 199° 42′.9; flagpole on Hudson's Bay Company manager's house, 212° 48′.8; base of cross on Roman Catholic Mission, 235° 38′.4.

York Sound, Baffin Island, 1941.-- In a harbor on south side of Frobisher Bay, believed to be York Sound, but not certainly identified because of inaccuracy of maps of this region. Position determined by observations at this time, Latitude 62° 26′ N, Longitude 66° 30′ W. On a slight elevation about 30 feet (9 meters) northwest of a projecting point of land, and near the ruins of several Eskimo huts; marked by a tent peg with cross on top covered by a cairn, and further identified by an "L.A.B." brass disc on high point of rock about 10 feet (3 meters) east of cairn. True bearings: top corner of small cliff on second promontory north of large indentation near southwest corner of harbor, 43° 07′.8; notch between twin peaks near eastern point of harbor, 272° 23′.1.

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Antoine Point, Panama, 1928.--Located about 80 yards (73 meters) southwest of the Antoine Point Astronomical station and was marked by a cement pier. True bearing: left tangent of first small island nearest the bay, 67° 54′.0.

Champerico, Guatemala, 1939.--Close reoccupation of CIW station of 1907 at Chapan a small saltworks about 0.75 mile (1.2 kilometer) northwest of Champerico, across lagoon of salt water and within large plot of ground; 20 paces (about 17 meters) southeast of outer masonry wall of house in Chapan in line with seaward wall of house (not porch); not marked. True bearings: radio antennae post at gable at near end of third building from the sea, 312° 33′.5; flagpole at west end of building nearest the beach, 317° 47′.0.

Chichicastenango, Guatemala, 1939.--On north side of hippodrome grounds, just outside of city on road to Quiche; 50 feet (15 meters) south of adobe wall, east of grandstand and 75 feet (23 meters) northwest of northwest corner formed by piling; not marked. The road entering hippodrome grounds passes between the station and the piling. True bearing: south edge of south post of gate in wall to east of highway, 304° 35′.0.

Coban, Guatemala, 1939.--Practical reoccupation of CIW station of 1907, on the grounds of El Calvario, on a knoll overlooking city from northwest; about 75 feet (23 meters) from the site of the old station, 25 feet (7.6 meters) from the south side of Guadeloupe Sanchez Monument and in line with east end, 20 feet (6.1 meters), measured at right angles, from the wall of steps leading from chapel on hill to street; not marked. True bearings: cross over main entrance to El Calvario Chapel, 214° 42′.5; cross over main entrance to cathedral, 305° 24′.4; center of clockface at cuartel, 312° 29′.8.

Colon, Sweetwater, Panama, 1932.--Close reoccupation of CIW station of 1921 and 1922 which could not be

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used because of being below tidewater level, about 11 feet (3 meters) west of former station, across bay due west of Cristobal on north side of Sweetwater Inlet, about 170 paces north along shore from footbridge where the 8 inch (20 centimeter) water-pipe line crosses the inlet, in a group of four palm trees three of which form an equilateral triangle about 20 feet (6 meters) on each side, 6.5 feet (1.98 meters) from the northeast tree, 16.6 feet (5.06 meters) from the northwest tree, 22.4 feet (6.83 meters) from the south tree of the triangular group, and 5.5 feet (1.68 meters) north of the direct line joining the centers of the northeast and northwest trees; marked by a 10 inch (25 centimeter) hardwood brassbound peg driven slightly below sandy beach surface. True bearings: extreme left edge of Washington Hotel, 247° 52'.8; central flagpole on Washington Hotel, 248° 07'.0; taller of two large chimneys close together, 249° 45'.2; pilots' signal tower behind pier 6, 261° 24'.4.

Colon, Washington Hotel, Panama, 1932.-- Exact reoccupation of CIW station of 1915, 1916, 1922, and 1926, on grounds east of Washington Hotel, in Bolivar Street near its end at the sea wall, north-northwest of Christ Episcopal Church, 8.95 meters from center of fourth pillar in eastern wall of hotel grounds, the corner pillar where this wall joins the sea wall being No. 1, 0.8 meter south of line drawn at right angles to center of the fourth pillar, 20.7 meters southeast of corner pillar, 23.9 meters southwest of end of sea wall, and 31.3 meters from iron lamppost opposite northwest corner of church; marked by a hardwood stake 2 inches (5 centimeters) square, with brass screw in center, and driven flush with ground. True bearings: light at east end of west breakwater, 145° 08'.8; light at west end of east breakwater, 157° 17'.4; light at east end of east breakwater, 202° 33'.6; flagstaff on fort across channel, 222° 14'.2; tip of large water tank, 252° 23'.9.

Corinto, Nicaragua, 1931.-- Practical reoccupation of CIW station B of 1923, on island across the bay south and somewhat east from Corinto, on point of land just west of a house situated on a bluff and visible from the town; 31 feet (9.5 meters) from high-water mark on shore line to north, 77 feet (23.5 meters) from this same line to eastward, 3 paces from edge of vegetation southward; marked by round brassbound oak stake projecting slightly aboveground. True bearings: light on northerly end of Cordon Island, 113° 47'.3; gable of present American consulate, 161° 14'.4; tip of church steeple in Corinto, 169° 46'.0.

Corozal, Panama, B, 1932.--Exact reoccupation of CIW station B of 1926. On open ground between army post headquarters building and barracks of the Tenth Signal Corps, 33.2 meters west of lone tree at foot of hill where radio station stands, 11 meters north of path between the two buildings just mentioned, 187.7 feet (57.25 meters) from the northeast corner of headquarters building, 180.5 feet (55.05 meters) from northwest corner of officers' quarters, 238.0 feet (72.59 meters) from northwest corner of barracks, and 72 feet (22.0 meters) south of bamboo clump; marked by concrete post 6 inches (15 centimeters) square projecting about 1.5 inches (4 centimeters) aboveground. True bearings: triangulation station on hill across canal, 2 miles (3 kilometers), 68° 47'.5; vertical iron pipe, about 140 yards (128 meters), 130° 49'.8; triangulation station on hill to right of bamboo clump, 208° 00'.3; west gable of Tenth Signal Corps barracks, 328° 18'.0.

Granada, Nicaragua, 1931.-- Close reoccupation of CIW station of 1923, in northwestern part of town, two blocks west of Avenida Central, the main street, north of Calle 5, and northwest of a masonry viaduct over a deep ravine where it crosses Calle 5, 39.8 feet (12.16 meters) from the southeast corner of a house and 40.9 feet (12.48 meters) from corner of fenced enclosure to northwest; marked by brassbound tripod stake projecting 0.50 inch above the surface. True bearings: flagpole on hospital, 63° 01'.3; cross over gable of San Francisco Church, 286° 04'.1; cross on dome of cathedral, 306° 49'.0; cross on tower of La Merced Church, 341° 43'.6.

Guatemala City, Guatemala, 1939, 1940.--Three stations were occupied. Station B was an exact reoccupation of B of 1923 and 1926, at extreme southeast corner of grounds of El Fuerto Banos at eastern extremity of Calle Oriente 10; 125 feet (38 meters) north of bank of arroyo, at intersection of road running north to water tank and road along arroyo; marked by concrete monument 8 by 8 by 24 inches (20 by 20 by 61 centimeters) lettered "CIW 1926, B." True bearing: south wireless tower, 58° 22'.5.

Station C is on grounds of the Meteorological Observatory, "Finca Aurora," south of Guatemala City, 46.8 feet (14.26 meters) from southeast corner of main observatory building, 136.2 feet (41.51 meters) from a survey benchmark; marked by a stake to be replaced by a concrete post. True bearing: benchmark, 123° 06'.8..

Guatemala Base, station 1940, established for control and reduction of vertical-force variometer observations for magnetic survey of the volcanic rift of Guatemala; located on pasture land at the Finca "El Pilar," property of Senor Molina; about 5 miles (8 kilometers) southeast of Guatemala City; about 150 or 175 yards (137 to 160 meters) north from the entrance to the property, 215.6 feet (65.7 meters) west from the center of gateway leading from the finca road into the pasture, and 49.0 feet (14.9 meters) north of the hedge and fence between the pasture and a small plot planted to coffee. Marked by a heavy peg driven flush with surface. True bearing: aviation-beacon tower, 145° 07'.9.

Huehuetenango, Guatemala, 1939.--Exact reoccupation of CIW station of 1907; on a knoll near the Temple of Minerva, about 0.6 mile (1 kilometer) east of the city, about 1 foot (0.3 meter) southeast of prolongation of northeast and southwest diagonal of temple, 74.2 feet (22.62 meters), 33.5 feet (10.21 meters), and 73.9 feet (22.53 meters), respectively, from the northwest, southwest, and southeast corners of the lower foundation of the temple. True bearings: southerly tower of church, 270° 50'.3; northern tower of church, 272° 15'.5; dome on church, 273° 39'.5; tower on cuartel, 276° 59'.5.

Old Panama, Panama, 1932.-- Exact reoccupation of CIW station A of 1921, 1923, 1924, and 1926, in the plaza of Old Panama, near ruins of old cathedral tower, in line with face of tower which is towards the sea, 72.0 feet (21.96 meters) from southwest corner of tower, 133.5 feet (40.72 meters) from lone palm tree near beach, 126.8 feet (38.67 meters) and 118.4 feet (36.11 meters), respectively, from concrete lampposts at northeast and southeast corners of small park in front

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of two restaurants near end of automobile road; marked by concrete block 14 inches (36 centimeters) square set flush with ground and lettered "CIW-A-1926." True bearings: extreme left edge of Taboguilla Island, 6° 38′.6; gable of house on Culebra Island, 23° 47′.4; ornament at right-hand corner of new cantina, 59° 55′.0; gable of house to west, 69° 24′.7.

Puerto Armuelles, Panama, 1934.--On property belonging to the Chiriqui Land Company (Panama branch of United Fruit Company). A standard survey marker was left embedded in concrete in the ground about 6 inches (15 centimeters) below surface. The location is a matter of record with the engineering department of the land company. True bearings: magnetic mark, 1° 15′.3; center of seaward radio tower, 233° 37′.6; azimuth mark, 329° 26′.1.

Puerto Barrios, Guatemala, 1939.--Close reoccupation of CIW station of 1909 and 1923; at northeast corner of plot of ground lying north of commissary of United Fruit Company, 12 feet (3.6 meters) east and 36 feet (11.0 meters) south of extensions of east and south walls of large building north of the plot; not marked. True bearings: east gable of United Fruit Company's commissariat, 16° 45′.4; left-hand radio tower, 306° 23′.7; right-hand radio tower, 310° 40′.7; east side of water tank, 331° 20′.4.

Note: Former station could not be occupied because of swampy ground.

Puntarenas, Costa Rica, 1934.--Close reoccupation of CIW station of 1907, on property belonging to the Catholic Church, 102.4 feet (31.20 meters) from northeast corner of buttress on north side of main entrance of church, 95.2 feet (29.03 meters) from northeast corner of east buttress of side entrance on north side of church, 186.2 feet (56.75 meters) from the northwest corner of church, and 53.2 feet (16.23 meters) from edge of sidewalk to north. Marked by a U.S. Navy Survey marker cemented in a brass pipe driven in ground 4 inches below surface. True bearings: azimuth mark, northeast corner of house across street, 0° 07′.1; northeast corner of buttress on north side of main entrance to church, 28° 01′.1; spire of church, 30° 41′.2; northwest corner of church, 70° 36′.7; radio mast, 76° 05′.4; northwest corner of Commandancia, 323° 01′.4.

Quezaltenango, Guatemala, 1939.--Approximately at location of CIW station of 1923, on grounds of hippodrome about 0.6 mile (1 kilometer) southeast of the city. About 30 paces (25 meters) from a barbed wire fence along southeasterly side of track enclosure, at intersection of center lines of three streets seen when looking across central part of enclosure; marked by cluster of small stones embedded in ground. True bearing: flagstaff on Kiosk across the oval track, 124° 12′.4.

Note: This station served as base station for magnetic survey of Santa Maria, 1939.

Quezaltenango, Guatemala, 1940.--On grounds of the hippodrome about 0.75 mile (1.2 kilometer) east of the city; near a group of pine trees southeast of the oval track; 9 paces (about 8 meters) south of the nearest tree of the westerly row of trees, 15 paces (about 13 meters) from the nearest tree of the same row toward south and west, and 25 paces (about 22 meters) from a double cedar tree toward the southeast; marked by a heavy tripod peg driven slightly below surface. True bearings: right-hand one of twin towers on small church, 61° 05′.2; cross on main dome of cathedral, 80° 05′.8; center of clockface in square tower, 107° 09′.3. This station is a practical reoccupation of CIW station of 1939 the surroundings of which were changed to such an extent that the 1939 description was no longer applicable. Station of 1940 is about 40 paces south and slightly east of the 1939 location.

Retalhulen, Guatemala, 1939.--East of the town on the grounds of the hippodrome, approximately 1.1 miles (1.8 kilometer) from the Palacio in Retalhulen; 30 paces (about 25 meters) from the northerly corner of the clubhouse and on a line between this corner and the center of the grandstand; not marked. True bearings: spire on southeast dome of Santiaguito, 206° 10′.0; southeast corner of upper coping on Barrios Monument, 244° 00′.6.

Salama, Guatemala, 1939.--Practical reoccupation of CIW station of 1907, on a knoll south of road leading from Salama to Coban, just west of the bridge across the Orotapa River; 20 feet (6 meters) from edge of knoll measured along a line toward an abandoned adobe hut; not marked. True bearings: apex of façade on temple of Minerva, 40° 36′.8; dome of church, 50° 34′.6; cross over church entrance, 56° 21′.8.

San José, Costa Rica, 1931, 1934.--Three stations were occupied. Station A was practical reoccupation of CIW station of 1907, northwest of the city and in suburb known as Guadelupe, on north bank of Rio Torres directly opposite Bolivar Park, about 200 feet (61 meters) from the electric tramway between Guadelupe and San José, about 2000 feet (0.6 kilometer) west of railway, 62 paces from hedge and wire fence along northerly side of area, and 43 paces and 51 paces, respectively, from the east and west boundaries, 13.8 feet (4.20 meters) west of an orange tree in approximate center of plot; marked by a wooden stake. True bearings: center of cross on dome of cathedral, 37° 48′.7; west steeple of La Merced Church, 58° 15′.3; center of ball on cross at west end of Church of San Francisco de Guadelupe, 187° 00′.9; center of cover over smokestack of Compania Nacional de Licores, 359° 49′.2.

Station B, 1931, was a practical reoccupation of CIW station of 1923, north of the city and just west of the National Penitentiary, 140.0 feet (42.67 meters) directly opposite the seventeenth buttress from the southwest corner of the penitentiary wall which is also the tenth from the northwest corner, 191.0 feet (58.22 meters) from the bank of the river, 100.5 feet (30.63 meters) nearly due south of a lone tree; marked by a wooden peg projecting slightly aboveground. True bearings: northeast corner of adobe house across river, 10° 52′.4; cross on dome of cathedral, 342° 00′.3; base of flagpole on Casa de Correos, 346° 16′.7; base of flagpole on central tower of building, Segunda Seccion de Policia, 349° 42′.6.

This station closely reoccupied in 1934, the point of occupation being about 100 feet (30 meters) east of the 1931 location; 40.4 feet (12.30 meters) opposite the tenth buttress from the northwest corner of the penitentiary wall and 135.0 feet (41.15 meters) and 153.4 feet (46.75 meters), respectively, from the first and twentieth buttresses of the west wall; marked by a U.S. Navy survey brass station-mark set about 4 inches (10 centimeters) below surface of the ground. True bearings:

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apex of roof of corrugated iron building, 5° 00'.6; left spire of La Merced Church, 17° 00'.6; right spire of La Merced Church, 19° 55'.3; center of buttress number 10, 259° 22'; ball on south tower of west wall, 335° 01'.1.

Station D was a practical reoccupation of CIW station D of 1926, near southwest corner of grounds of San José Golf Club, located by two reference stones on the west and south boundaries of the grounds, each about 30 feet (9.1 meters) from the southwest corner; 32.4 feet (9.88 meters) east of a drill hole in the top of the west-line marker, and 33.45 feet (10.20 meters) north of drill hole in top of south-line marker. Marked by stones about 12 inches (30 centimeters) square and 8 inches (20 centimeters) deep, set flush with ground and lettered "CIW." True bearing: northwest corner of hut across south portion of tennis courts, 280° 49'.8.

This station closely reoccupied in 1934, the point of occupation being south of clubhouse; 55.6 feet (16.95 meters) from a point designated as "South Rock," 37.0 feet (11.29 meters) from "West Rock," 83.8 feet (25.50 meters) from center of a memorial tablet set in stone wall, and 56.6 feet (17.24 meters) just beyond "South Rock" used as an azimuth mark. True bearings: South Rock, 8° 29'.1; post near South Rock, 8° 29'.4, West Rock, 61° 12'.7; left side of tablet in wall, 237° 56'.7; right side of same tablet, 238° 23'.6.

San Marcos, Guatemala, 1939.-- Practical reoccupation of CIW station of 1907, on athletic grounds about 0.50 mile (0.8 kilometer) east of city proper, along road to Quezaltenango, north of new "Palacio" (under construction), 248.4 feet (75.71 meters) north and 2.5 feet (0.76 meter) east from northeast corner of bay window at east end of the new palacio; not marked. True bearings: steeple on El Calvario, 45° 09'.4; near corner of square tower on Cuartel, 74° 17'.9; fence post, sixth from north in fence line to eastward, 293° 12'.9.

Telvers Island, Canal Zone, 1935.-- On the west bank of an old French canal leading southward from the vicinity of the coaling plant on the north shore of the island. The station was on a footpath on the west bank of the canal, about 0.50 mile (0.8 kilometer) south of a railroad bridge, and 50 feet (15 meters) south of a wooden bridge spanning the inlet of a small drainage canal leading into the main canal from the west. The theodolite was mounted on the same footpath about 75 feet (23 meters) north of the same small bridge. The theodolite was used as declination mark and bore 200° 32'.0 west of true south.

Uvita Island, Costa Rica, 1931.--Close reoccupation of CIW station of 1923, in northwestern part of the island on a hill about 250 feet (76.2 meters) west of lighthouse and near remains of old foundation of former quarantine hospital, 16.7 feet (5.09 meters) north of the northwest corner of main foundation, 24.9 feet (7.59 meters) west and slightly north of the northwest corner of the wing foundation; marked by a round brassbound oak stake left projecting 1.5 inches (4 centimeters) aboveground. True bearings: smokestack of United Fruit Company's cacao plant in Limon, 74° 23'.0; left smokestack of railroad shops in Limon, 96° 00'.9; right smokestack of railroad shops in Limon, 96° 26'.1; left tower of Tropical Radio near United Fruit station, 108° 18'.5; right tower at same station, 109° 55'.2; tip of lighthouse on Uvita Island, 265° 40'.6.

Zacapa, Guatemala, 1939.-- Close reoccupation of CIW stations of 1907 and 1926 about 0.25 mile (0.4 kilometer) east of railway station, on road to old town of Zacapa; near highest point of conspicuous knoll; about 50 feet (15 meters) north of the road; not marked. True bearings: No. 2 tower, 18° 09'.6; overflow vent on railway water tank, 36° 26'.8.

Greenland

Agto, 1943.--Almost directly west of church and bestyrer's (mayor's) house, on grassy plot in a defile which was about 25 feet (8 meters) wide and 125 feet (38 meters) long, 2 paces from south wall, 9 paces from north wall, and 7 paces from red rock to west. True bearing: south edge of church chimney, about 200 yards (180 meters), 249° 39'.6.

Angmagssalik, 1943.-- On flat rock atop hill on southeast side of harbor. True bearing: church steeple to northwest, 141° 52'.5.

Angmagssalik Fiord, 1943.-- On level area west of small rock hill which was about 50 yards (45 meters) from shore on west side of Angmagssalik Fiord, 40 paces from shore towards mark, 22 paces from stream, and about 30 paces from base of rock hillock to the east; marked by a stake driven into ground and covered with a small cairn. True bearings: junction of two mountains at end of fiord, 41° 41'.4; cleft of high split peak north of camp, 212° 47'.2; sharp peak above glacier to east across fiord, 289° 36'.0.

Atangmik, 1943.--On level mossy space about 175 feet (53 meters) east of church. True bearing: notch in mountain to east, 299° 37'.2.

Comanche Bay, 1943.-- On flat sandy patch about 12 feet (3.5 meters) round on small boulder-strewn tongue of land about 300 yards (275 meters) northwest of cabins, 109.6 feet (33.41 meters) from vertical face of rock to southeast, 9 paces from high water to west. True bearing: notch in point at south entrance to bay, 2° 16'.4.

Cruncher Island, Sondrestrom Fiord, 1943.-- On flat rock near shore on northwest extremity of the island. True bearings: radio range mast to west, 2 miles (3.2 kilometers), 93° 37'.8; first radio mast at camp (right edge of base), 297° 07'.1.

Egedesminde, 1943.-- On large island north of village, about midway between its north and south shores and about one-third the length of the island from its eastern end, 103 paces northeast of upper wooden triangular post of harbor range, about 32 paces northwest of western edge of grassy plot used as tent site by Greenlanders, about 150 feet (46 meters) east of highest point on island, 4.5 paces northeast of reddish outcropping, 7 paces north of another outcropping, 8 paces south of boulder with reddish vein on southern side; marked by a tent peg covered with cairn. True bearings: cairn on highest point of hill on west side of harbor, 42° 33'.0; upper post of range facing Station Island, 77° 03'.0; cairn on hill to south-southeast, 333° 35'.9; church steeple, 359° 46'.3.

Etah, 1937, 1941.-- Exact reoccupations of CIW stations of 1908 and 1923, about 400 feet (122 meters) north of extreme end of Reindeer Point, 55.4 feet (16.89 meters) south of bottom of ledge of rock, and 97.8 feet

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Greenland--continued

(29.81 meters) east of foot of vertical stratum of rock in ledge on west; marked by an "L.A.B." brass marker set in a flat stone and placed in exact position of tent peg marking former station. True bearings: step in cliff to left of John's Glacier, 283° 21′.8; top corner of cliff to right of John's Glacier, 291° 58′.1; left edge of table rock to south, 315° 33′.6.

Faeringerhavn, 1943.--On a hilltop north of the anchorage, 40 feet (12.2 meters) west of a pond, 150 feet (46 meters) from the shore line, and 30 feet (9.1 meters) from a wall to the southeast. True bearings: beacon at mouth of harbor, 0° 15′.2; west roof corner of large white house (Livd), 24° 16′.6.

Fiskenaes, 1943.--On level grassy plot about 40 feet (12 meters) round, northeast of settlement, about 50 feet (15 meters) from water's edge, and about 200 yards (180 meters) from bestyrer's (mayor's) house across low land; marked by a small cairn. True bearing: cairn on hill to southwest across harbor, 38° 27′.6.

Frederiksdahl, 1943.--In center of grassy plot near middle of island in harbor, 22.9 feet (6.98 meters) from vertical wall of rock to northeast, 20.7 feet (6.31 meters) from rock to northwest, and 43.0 feet (13.11 meters) from east edge of flat cracked rock to east; marked by pointed stone sunk in ground and covered by cairn. True bearing: vertical part of cross on church, 152° 05′.0.

Frederikshaab, 1943.--East of settlement and north of stream, almost in line with flagpole and gasoline storage tank, 27 paces east-by-south of this tank, southeast of school and northeast of church, and about 200 feet (60 meters) north of stream; marked by small cairn. True bearing: cairn on hill west of harbor, 85° 45′.8.

Frederikshaab Glacier, 1943.--On a rock in the middle of a grass-covered island which was at low-water line and due north of the northernmost point of the glacier and about 3 miles (5 kilometers) from the glacier. The station was southwest of a small lake at the northern end of the island, and southeast of another island on which was an outcrop of black rock. True bearing: cairn on island to southeast, 290° 02′.2.

Godthaab, 1941, 1943.--The stations of 1923 and 1924 were no longer available owing to erection of steel buildings and gasoline storage tanks in the vicinity; therefore a new station was selected on the mainland about 0.3 kilometer north-northwest of the former station, on a high rocky point; marked by an "L.A.B." brass marker and a cairn. True bearings: cairn on hill, 1.4 kilometer, 10° 18′.8; right edge of cairn at base, 0.5 kilometer, 90° 37′.1; left-hand edge of mountain peak to northeast, 218° 04′.0.

Holstensborg, 1943.--On the southerly one of two small islands at the mouth of the fiord in which Holstensborg is situated, the island being about 200 feet (60 meters) long and 75 feet (23 meters) wide. Several veins of shallow rock run generally north and south. The station was situated at about the highest point of the island, on a flat area of rock, on the eastern edge of a 6 inch (15 centimeter) wide vein, and 104.2 feet (31.76 meters) north of a ringbolt fastened in rock at the southern end of the island; not marked. No latitude, azimuth, or declination observations were obtained.

Ilivilik Fiord, 1943.--On the east shore of a small bay on the south coast of Ilivilik Fiord about 1 mile (1.6 kilometer) from the east end of the fiord, on a flat rock about 50 feet (15 meters) from the shore line, between a slope strewn with stones on the north and a grass-covered slope on the south; marked by a small rounded rock covered by a cairn. True bearing: cleft between two peaks on Ilivilik Island, 132° 27′.2.

Ivigtut, 1943.--On level grass-covered plot near shore about 150 feet (45 meters) east of magnetic huts; marked by pile of stones. True bearings: range-light west of harbor, 78° 55′.4; highest point on peak to west, 89° 22′.0; peak to northwest, 152° 43′.1; peak to northeast, 241° 20′.6.

Jakobshavn, 1943.--On hill east of settlement, about 235 paces east-southeast of bestyrer's (mayor's) chicken house, about 175 paces south of harbor, about 60 feet (18 meters) north of Marraklinquak (place where clay is found), on level sandy area between two not quite parallel (northeast to southwest) outcroppings about 32 feet (10 meters) apart, 14.5 feet (4.42 meters) and 17.5 feet (5.33 meters), respectively, from the southerly and northerly outcroppings; not marked. True bearings: cairn on hill to southwest, 48° 49′.0; cairn in southern part of settlement, 94° 13′.3; monument in southern part of village at mouth of bay, 125° 09′.0; apex of eastern gable of oil-rendering house across bay, 166° 43′.3; cairn on hill above head of bay, 253° 37′.0.

Julianehaab, 1943.--Exact reoccupation of the Louise A. Boyd Expedition station of 1941, near the highest point of the hill on the east side of the harbor, about 1 foot (0.3 meter) distant from a bronze marker of the Danish Geodetic Survey, and marked by an "L.A.B." metal disc, both markers left covered by a cairn. True bearings: cairn on low point to the west, 64° 55′.8; top of main radio tower, 86° 58′.2; small cairn on mountain to the north, 165° 30′.0; cairn on mountain to east, 272° 50′.6.

Kapasigdlit, 1943.--In the middle and at or near the highest point of a small island about 300 feet (90 meters) east of the bestyrer's house; marked by a small cairn. No azimuth observations on account of rain.

Kugssuak, 1943.--On the western side of the mouth of a bight on the south side of Sondrestrom Fiord, about half-way from mouth to head, on flat tongue of rock about 20 by 50 feet (6 by 15 meters) and 2 or 3 feet (0.75 meter) above high-water mark, 2.8 feet (0.8 meter) from the west edge of the tongue, 12 feet (3.7 meters) from the east edge, and 17 feet (5.2 meters) from the north end. True bearing: an almost perpendicular drop in outline of ridge to east, 257° 00′.5.

Marrak, 1943.--Near the shore line and not far from the northeast corner of a house (guardhouse?) True bearings: range light, 39° 27′.3; east cornice of guardhouse, 347° 51′.1.

Nanortalik, 1943.--Located on smooth flat rock at highest point of small island just beyond mouth of harbor, 13.4 feet (4.1 meters) from high-water mark on north side of island, 46 feet (14 meters) from high-water mark on east side, 23 feet (7 meters) and 33 feet (10 meters), respectively, from similar points on south and west sides, 5.25 feet (1.6 meter) from a crack in the rock to the east and 7.40 feet (2.26 meters) from a crack to north; marked by small cairn. True bearing: right edge of cairn on point to north, and east of harbor, 150 yards (135 meters), 175° 30′.4.

Narsalik, 1943.--On a rocky point southwest of the settlement, about 30 feet (9 meters) back from the shore

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line; marked by a cairn. True bearings: west gable of stone house to the southeast, 297° 18′.2; highest point on rocky promontory southwest of station, 200 yards (182 meters), 29° 17′.9.

Narsarssuak, Tunugdliarfik Fiord, 1941.--On first projecting point of land across the river and up the fiord from the landing field, about 15 feet (4.5 meters) northeast of an "L.A.B." brass marker which was placed in about the highest point of rock as close to the water's edge as possible; marked by a tent peg covered with a cairn. True bearings: notch on mountain skyline to east, 244° 42′.0; wooden marker beacon on landing field, 341° 52′.9; second wooden marker beacon on landing field, 346° 43′.8.

Prince Christian Sound, 1943.--On small moss-covered path on rock in cove on south side of Prince Christian Sound, about 1.50 miles (2.5 kilometers) from eastern end of sound; marked by a cairn. True bearing: saddle between twin peaks, about 5 miles, 113° 09′.2.

Sangmissok, 1941.--About 15 miles (24 kilometers) north of Cape Farewell, the extreme southern point of Greenland, on east side of intersection of several fiords, near the center of a flat ledge of rock just above the north bank of a small stream, and a few feet east of a point directly opposite the governor's house at Sangmissok; marked by an "L.A.B." disc surrounded by a small cairn. True bearings: notch in south peak, 23° 09′.4; west peak, 120° 41′.8; north peak, 197° 29′.3.

Sondrestrom Fiord 3, 1943.--On bare knoll midway between fiord and a lake, about 40 yards (35 meters) northeast of stream flowing from lake to fiord, the knoll extending southwest from road leading to lake, about 150 yards (140 meters) distant, on level area about 20 feet (6 meters) from southwest end of knoll; marked by a stake projecting 2 inches (5 centimeters) aboveground and covered by a cairn. True bearings: notch on mountain, 142° 28′.0; corner of filter-house at edge of lake, 314° 44′.0.

Sukkertoppen, 1943.--In middle of small [15 feet (5 meters) across] moss-covered depression near center of small island east of entrance to Sukkertoppen Harbor, about 0.25 mile (0.4 kilometer) east of oil tanks on island and about the same distance southeast from Jerret's house at a point near harbor entrance; marked by a cairn. True bearings: range-mark on island at mouth of harbor, 24° 51′.2; cairn to left of oil tanks, 44° 54′.0; cairn above oil tanks, 51° 05′.3; high flagpole at Sukkertoppen, 78° 44′.8; sharp-pointed cairn to far right of Sukkertoppen, 120° 25′.9.

Thule, 1941.--About 260 feet (80 meters) northwest of flagpole in front of the local governor's house, and about 48 feet (15 meters) from a ridge of gravel which marks the approximate shore line at high tide; marked by an "L.A.B." marker in small partially-embedded rock. True bearings: highest point of projecting boulder on Peary Memorial Rock near center of small shoulder a short distance above water on the harbor side, 70° 54′.9; cairn on top of Peary Memorial Rock, 79° 29′.7; right edge of flagstaff at bottom, 286° 42′.8.

Upernivik, 1941.--On small island just off shore, on small level grass-covered plot, 15 feet (4.5 meters) southeast of the edge of a small pond, directly across pond from a high rocky peak, 15 feet from a prominent boulder which was in line with flagstaff in Upernivik, and 195 feet (59.4 meters) from the extreme end of the island opposite the flagstaff; marked by an "L.A.B." brass marker cemented into a small, partly-embedded boulder. True bearing: cairn on skyline of island to southwestward, 39° 20′.6.

Newfoundland

Battle Harbor, Labrador, E, 1941.--Station C of 1921, 1922, and 1923 could not be exactly located because drill holes in the rock could not be definitely distinguished. Station D of 1914, 75.9 meters northwest of C, was found. The new station, E, was established about 9 feet (2.7 meters) northeast of C because it had been marked as a magnetic station of the Dominion Observatory of Ottawa by means of a bronze disc cemented into the rock. Station E was 36.7 feet (11.19 meters) east of the natural step in the rock, and about 28 feet (8.5 meters) south of a prominent embedded rock on the opposite side of the natural ditch which extends northeast and southwest. True bearings: station D, 75.9 meters, 143° 29′.6; lighthouse on Double Island, 318° 38′.4.

Goose Bay, Labrador, 1943.--No description of station.

Hebron, Labrador, 1943.--On gravel patch on high rock-strewn ground about 400 yards (350 meters) west of wooden buildings of the settlement, 200 feet (61.0 meters) in a northerly direction from northwest corner of burying ground; marked by stake projecting 6 inches (15 centimeters) aboveground and covered by small cairn. (The burying ground should not be confused with another enclosed by a fence and lying northeast of the one used as a reference). True bearings: cupola on church steeple, 291° 26′.3; cairn on hill to northwest, 138° 40′.1; cairn on hill to north, 187° 27′.6.

Hopedale, Labrador, 1943.--Exact reoccupation of the Louise A. Boyd National Bureau of Standards Expedition of 1941, and a close reoccupation of CIW station B of 1924, on ledge about 200 yards (183 meters) east of Moravian Mission, a short distance east of the highest point of the exposed rock, about 15 feet (4.6 meters) south of the edge of a small pond, and about 44 feet (13.4 meters) east of the highest point of exposed rock; marked by an "L.A.B." brass disc, cemented into the rock surface with small cairn built around it. True bearing: tip of cupola on mission church, 105° 21′.7.

Long Tickle, Labrador, 1943.--No description of station.

Nain, Labrador, 1943.--No description, but since this observer used the same azimuth mark established by a CIW observer in 1922 it is assumed that this observer reoccupied the former station, the description of which is as follows: Close reoccupation of U.S. Coast and Geodetic Survey station of 1881, about 0.25 mile (0.4 kilometer) north 15° east from flagstaff in front of mission house, and near some large boulders known as Martin's Stein, on shelf of dry, gravelly soil, bordered by lower marshy strip a few hundred yards in width, on which was a windlass for hauling up boats, at point 13.6 feet (4.14 meters) from juniper post marking station of 1881 and 12.4 feet (3.78 meters) from large boulder southwest of juniper post on line joining middle of boulder and post. True bearing: small boulder on hill across

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harbor approximately in line bisecting angle between old capstan and small lone house on shore, 323° 29'.0.

St. John's, Newfoundland, 1941.--Two stations were occupied, C and E. It was found that the site of station C of 1905 and 1909, on the Governor's Grounds, had been plowed and planted since about 1939, and that the marking stone had been plowed under. However, by means of the measurements, and careful search, the stone was recovered and reset as closely as possible to its former location, 85 feet (25.9 meters) southeast of stone inscribed V 1881, 86 feet (26.2 meters) from the north fence, 129.9 feet (39.60 meters) from west fence, and 169.3 feet (51.60 meters) from northwest corner of fence; marked by sandstone block lettered "CIW 1909" on top, a hole in the center indicating the exact spot. True bearing: Central Fire Station, 26° 00'.0 (scaled from Admiralty Chart because weather prevented solar observations).

Station E was established because of possible unavailability of C in future years. On grounds of Memorial University, on a raised sodded area dividing the road in front of the main building, 100 feet (30.5 meters) south and 50 feet (15.24 meters) east from the southeast corner of the original building; marked by an "L.A.B." brass marker set in a concrete block flush with ground surface. True bearing: tip of church tower to southeast, 286° 24'.8.

United States

Bay Quarter Neck, Virginia, 1928.--By the roadside about 0.33 mile (500 meters) before reaching the farm buildings on property belonging to the Colona Howard Lumber Company of Baltimore, opposite a gate leading into a field on the westerly side of the road, and just south of an intersecting road, 11 paces (9 meters) from the center of the main roadway, and 18 feet (5.4 meters) from the center of the intersecting road. True bearings: west gable of a large barn seen over a low shed, 205° 21'.4; base of radio mast at small farmhouse, 220° 11'.4.

Briscoe Creek, Maryland, 1928.-- Located at "Southwood Farm," owned by Mrs. H. A. Beal of Scotland, Maryland, about 2 miles (3 kilometers) by road from Scotland post office, in a grassplot northwest of the farmhouse, about 30 paces (25 meters) back from the present riverbank, 90 paces (75 meters) from the hedge at the upper end of the plot, 30 paces (25 meters) from the fence at the edge of the timber to the northward, and 23 paces (20 meters) from the fence line separating the grassplot from the garden. True bearing: left-hand beacon at the entrance to Smith Creek,.129° 16'.5.

Callao, Virginia, 1928.--Across the street from the schoolhouse and almost directly opposite entrance to the building, near a basketball court and 37 paces (32 meters) from the center of the street. True bearings: tip of cupola of large barn, 54° 39'.4; center rod of windmill just below platform, 171° 50'.4.

Cheltenham, Maryland, 1935-1944.-- Observations for standardization of magnetic instruments were made in the absolute building at Cheltenham Magnetic Observatory.

Dawsonville, Maryland, 1930.-- The U. S. Coast and Geodetic Survey station of 1903 could not be exactly relocated owing to the disappearance of the locust post marking the former station, but from measurements a probably close reoccupation was secured. The new station is N 13° 54' W of the middle line of the north front of Darby's store, 120 feet (37 meters) west of a road where the road makes a slight bend, 167 feet (51 meters) south of the south corner of a barn, and 90 yards (82 meters) northeast of a telephone pole; not marked. True bearings: telephone pole, 90 yards (82 meters), 29° 53'.8; a straight oak tree in the center of a group of five trees distant about 0.50 mile (0.8 kilometer), 119° 29'.3; front peak of Darby's store, 346° 05'.9.

Deep Creek, Maryland, 1928.-- About 600 feet (180 meters) from main road leading to Point Lookout at a sharp turn in the road leading to Deep Creek, 15 paces (13 meters) from the hedge along the southerly side of the road near a sharp turn, and 13 paces (11 meters) from the center line extended of the road beyond the sharp turn. True bearing: gable of barn to northward, 205° 43'.5.

Great Mills, Maryland, 1928.-- Approximately in the center of a triangular plot at the intersection of the road to Great Mills and the main state highway, 24 paces (20 meters) from the Great Mills road and 20 paces (17 meters) from the state highway measured at right angles in each case, 29 paces (25 meters) from the highway along the line toward the azimuth mark, and 44 paces (37 meters) from the nearer end of a culvert under the highway. True bearing: steeple of church in Great Mills, 146° 26'.9.

Heathsville, Virginia, 1928.--Near the southeast corner of the public school grounds about 0.75 mile (1.2 kilometer) west of the town, 8 paces (7 meters) from each of the east and south boundary lines of the school grounds. True bearings: left edge of left chimney of Mr. Allison's house, 210° 26'.3; cupola of Mr. Walker's barn, 285° 53'.4.

Hollywood Shores, Maryland, 1928.--About 500 feet (150 meters) southeast of a large residence which stands immediately south of Hollywood Inn, near the shore end and in the middle of the graded but as yet unused 17th street of the plot, about 30 feet (9 meters) from the present riverbank. True bearings: Kitt's Point magnetic station, 135° 07'.8; gable of nearby dwelling, 158° 06'.0.

Hull Neck, Virginia, 1928.--At the end of a byroad on the bank of the Potomac River, about 0.50 mile (0.8 kilometer) from the main road, 20 paces (17 meters) from the present bank of the river and 14 paces (12 meters) east of the line of center of the byroad. True bearings: Point Lookout light, 203° 39'.6; temporary mark for declination, 207° 35'.6.

Kinsale, Virginia, 1928.--In southwestern part of public school grounds, 28 paces (24 meters) from the edge of the north and south street, 20 paces (17 meters) from the edge of the east and west street and 30 paces (25 meters) from the southwest corner of the schoolhouse. True bearings: center shaft of windmill near top, 61° 19'.2; spire of Methodist Church, 354° 59'.3.

Kitt's Point, Maryland, 1928.--Two stations were occupied. Station A was in an open field west of Mr. Cooper's dwelling at Kitt's Point, 33 paces (28 meters) from the present bank of the Potomac River and about 20 paces

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United States--continued

(17 meters) southwest by south from a lone apple tree. True bearings: St. George's Island, station C, 90° 36'.8; white post east of Smith Creek, 246° 35'.0; black beacon in Potomac River, 292° 30'.8; tent at Hollywood Shores, 315° 05'.6.

Station B was 19.3 feet (5.9 meters) southeast of station A and in direct line toward the black beacon, and 61 feet (19 meters) nearly due south of a lone apple tree. True bearings: black beacon in Potomac River, 292° 30'.8; red beacon, 286° 29'.7; gable of house east of Smith Creek, 244° 52'.8.

La Plata, Maryland, 1930.-- The U. S. Coast and Geodetic Survey station of 1905 was no longer available, as the site was occupied by a general store. A new station was chosen on the athletic field of the town school, about 375 yards (340 meters) northwest of the old station, 279.4 feet (85.22 meters) east of the east wall of the school building, and 8 inches (20 centimeters) north of the line of the north wall of the school building; not marked. True bearings: courthouse tower, 315° 16'.5; cross on church, 337° 13'.5; knob on water tank, 343° 20'.7.

Leonardtown, Maryland, 1928.-- Two stations were occupied on the grounds of Leonard Hall High School, 1 mile (1.6 kilometer) north of Leonardtown. Station A was 126.5 feet (38.55 meters) from the fence along the road leading to the town, 210.5 feet (64.15 meters) from the nearest gatepost at entrance to south driveway and 190 feet (58.1 meters) from a row of trees along south side of north driveway. True bearings: tip of water tower in Leonardtown, 19° 25'.4; cross over west doorway of Leonard Hall School, 286° 36'.1.

Station B, a secondary station, was directly in the azimuth line from the Leonardtown water tower through A, extended, and 143.3 feet (43.70 meters) therefrom. True bearings: tip of water tower in Leonardtown, 19° 25'.4; right edge of cross on St. Mary's School, 300° 41'.3.

Lewisetta, Virginia, 1928.-- In an unused street in a region newly developed, 250 paces (210 meters) from the bank of the Potomac River and approximately 0.50 mile (0.8 kilometer) distant from the church in the village. True bearings: 62° 00'.1; chimney on house to eastward, 279° 21'.0.

McGuire's Wharf, Virginia, 1928.--On a slight rise in an open field on the right side of the road to the landing, about 120 yards (110 meters) from the wharf, and 17 paces (14 meters) from the center of the road. True bearings: chimney of house across the west branch of bay, 147° 27'.4; chimney of house seen directly over wharf, 178° 14'.0; south gable of new bungalow across east branch of bay, 259° 21'.2.

Mundy Point, Virginia, 1928.--On sloping grass-covered plot at rear of post office, directly in front of large residence, on extension of lawn extending to river opposite the breakwater, about 30 feet (9 meters) from present riverbank, and 50 feet (15 meters) southeast of a fence along northwest border of lawn. True bearing: beacon in ship channel, 214° 06'.3.

Ophelia, Virginia, 1928.--On Hack Neck about 1.75 mile (2.8 kilometers) east of Ophelia post office, at a point where the road makes a sharp turn from southeast to south, about 75 paces (65 meters) from the bank of the Potomac River and about the same distance southeast of a grove, almost in the line of the back extension of that part of the road beyond the turn southward. True bearings: Smith Point lighthouse, 291° 49'.7; left chimney of house to southward, 346° 09'.2; right chimney of same house, 346° 25'.1.

Piney Point, Maryland, 1928.--Located 128 paces (110 meters) from the base of Piney Point lighthouse, 70 paces (60 meters) measured at right angles from a graveled roadway leading to the lighthouse and 40 paces (35 meters) from high-water mark along the beach. True bearings: Blackistone light, 108° 00'.0; church steeple on St. George's Island, 296° 36'.7.

Point Lookout, Maryland, 1928.-- Two stations were occupied. Station A was a close reoccupation of CIW station of 1919, the area surrounding which was converted into grounds for a summer colony. The point occupied was about 50 paces (42 meters) from the center of 12 Street along Chesapeake Drive toward 11th Street, 8 paces (7 meters) from the center of the drive on the bay side, and 23 paces (20 meters) from the center of a group of three pine trees in the block between 11th and 12th Streets. True bearings: Point Lookout light, 6° 41'.1; station B, 89° 32'.3; Point No Point lighthouse, 196° 46'.2.

Station B was about 0.6 mile (1 kilometer) north and slightly west of the Point Lookout light and close to a small semicircular lagoon, in the middle of 10th Street, and 10 feet (3 meters) from the edge of the brush growing along the bank of the lagoon, and 217 feet (66 meters) from the middle of the intersection of 10th Street and Point Lookout Boulevard. True bearings: station A, 269° 32'.3; Point Lookout light, 344° 14'.6; tip of tower on lightkeeper's dwelling, 345° 19'.6.

St. George's Island, Maryland, 1928.--Three stations were occupied. Station A was on the Potomac side of the island and about two-thirds of the way toward the lower end; about 60 feet (18 meters) back from the present bank of river and 101.5 feet (30.9 meters) from the gate at entrance to small cemetery across the road, about 60 paces (50 meters) from the church, also across the road, and about 70 paces (60 meters) southeast by south from a small schoolhouse. True bearings: Blackistone Island lighthouse, 111° 52'.0; Piney Point lighthouse, 116° 12'.2; cross on Holy Family Chapel, 135° 15'.3; base of staff on nearby church, 187° 35'.4; station B, 339° 59'.7.

Station B was about 350 paces (300 meters) along the shore, downriver from A in a small grove of trees about 12 paces (10 meters) from the present bank of the river. True bearings: Blackistone Island lighthouse, 112° 41'.1; Piney Point lighthouse, 118° 03'.4; station A, 159° 59'.7; base of staff on nearby church, 165° 19'.6; steeple of Methodist Church, 178° 08'.4.

Station C was at the extreme southeasterly point of a small island off the east end of the main island and separated therefrom by a narrow channel of water except at low tide, about 50 paces (42 meters) southeast of a clump of pine trees. True bearings: Kitt's Point magnetic station, 270° 35'.7; red beacon at entrance to Smith Creek, 273° 37'.3.

St. Inigoes, Maryland, 1928.-- Located on a triangular plot of ground along roadway just south of the village, 26 paces (22 meters) at right angles from the diagonal road along the northeasterly side of the triangular plot, and 32 paces (27 meters) from center of roadway along

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south side of plot. True bearing: tip of cupola on dwelling house, 219° 03'.8.

Sandy Point, Virginia, 1928.--Two stations were occupied. Station A was about 150 yards (135 meters) downstream from the point at which the roadway reaches the riverbank, 6 paces (5 meters) from the center of the driveway and between the driveway and the river, 40 feet (12 meters) northwest from a cedar tree 10 inches (25 centimeters) in diameter at edge of riverbank, and 48 paces (40 meters) south-southeast from a large cedar tree 24 inches (60 centimeters) in diameter also between driveway and riverbank. True bearings: Piney Point lighthouse, 183° 38'.4; steeple of church on St. George's Island, 219° 33'.0; channel beacon at mouth of Yeocomico River, 312° 21'.8.

Station B was about 1.5 mile (2.4 kilometers) upstream from A, in a field about 500 feet (150 meters) northward from a barn, and about 30 feet (9 meters) from edge of high bank of Potomac River. True bearings: Ragged Point lighthouse, 151° 00'.5; Piney Point lighthouse, 196° 44'.4; Point Lookout lighthouse, 283° 18'.3.

San Francisco (Fort Scott), California, 1929.--Two stations, C and D, were established in the military reservation for comparisons with instruments of the yacht Carnegie. Stations A and B of 1921 could not be relocated as no markers of that occupation could be found, but the 1929 stations were established after the descriptions and photographs of the 1921 stations had been studied and it became certain that the 1929 stations were within 50 feet (15 meters) of the former. Station C was established on a level area northeast of the oval macadam road surrounding the parade ground, and about 250 feet (75 meters) from the road; not marked. True bearings: base of flagpole on parade ground, 4° 53'.4; lighthouse at inner end of Golden Gate, 171° 00'.4; campanile at Berkeley, 248° 28'.8; flagpole on Presidio Grounds, 299° 43'.4.

Station D was probably about 100 feet (30 meters) southeast of C (distance not recorded) near the footpath extending northwestward; not marked. No bearings.

Thicket Point, Virginia, 1928.--In an open pasture lot between the farm buildings and the river and directly opposite the center of the main part of the farmhouse, 102 paces (87 meters) from the fence separating the pasture lot from the garden, and 42 paces (36 meters) from the present bank of the Potomac River. True bearings: Piney Point lighthouse, 172° 42'.7; channel beacon at mouth of Yeocomico River, 212° 43'.3.

Warsaw, Virginia, 1928.--In an open field just east of the town, 23 paces (20 meters) from the center of a roadway to the east and on the highest point of land in the gently rolling field. True bearing: tip of bell tower of Warsaw Public School building, 154° 46'.4.

Washington, S.M.O., 1927-1935.--Until the middle of the year 1935, observations for the standardization of magnetic instruments were made in the Standardizing Magnetic Observatory located on the grounds of the Department of Terrestrial Magnetism at Washington. A description of this building may be found in the "Researches of the Department of Terrestrial Magnetism," volume II, pages 199-200. Subsequent to June, 1935, standardization observations have been made at Cheltenham Magnetic Observatory of the United States Coast and Geodetic Survey at Cheltenham, Maryland, 16 miles (25.7 kilometers) southeast of Washington.

White Point, Virginia, 1928.--At water's edge southwest of oysterhouse at landing near White Point, south of a small store on road leading from Kinsale to White Point landing, (secondary station).

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Argentina

Bahia Blanca, Buenos Aires, 1932.--Two stations were occupied. Station A was about 8 kilometers in an air line northeast of CIW station of 1919 and 1925, on airfield of the "Aeroposta Argentina," 9 kilometers by auto road almost due east of center of city, southwest of buildings on airfield, almost in line with fronts of hangar and airplane storage building, 8 inches (20 centimeters) southeast of this line, 146.5 meters) southwest of south corner of the airplane storage building, this corner being 297 paces southwest of the southwesterly wireless tower, and 57.9 meters from wire fence along northwest boundary of field measured from second post southwest of a post having iron brackets for holding and tightening wires; marked by cross in stone 6 by 6 by 22 inches (15 by 15 by 56 centimeters) set almost flush with ground. True bearings: brick chimney near elevator at port of Engineer White, 8 kilometers, 42° 41'.1; staff on gable end of residence, 0.50 mile (0.8 kilometer), 118° 06'.7; tip of dome on residence, 0.50 mile (0.8 kilometer), 121° 49'.3; knob near top center of water tank at Villa Harding Green, 0.6 mile (1 kilometer), 178° 25'.8; staff of wind indicator on storage building, 223° 16'.6.

Station B was a practical reoccupation of CIW station A of 1919 and 1925, probably about 300 yards (275 meters) southeast of former station A, in field about 10 kilometers south of Bahia Blanca, about 1 kilometer north of port of Engineer White, 11.2 meters from line of buildings extended on Sisco Street, the second street north of the one opposite the railway station, and 18 meters from the edge of a shallow ditch beside a wide, slightly graded road leading northward towards Bahia Blanca, and directly back of the northeasterly part of "Las Margueritas" children's home; not marked. True bearings: spire of tall single-spire church in Bahia Blanca, 179° 31'.0; tip of left-hand tower of twin-tower in Bahia Blanca, 182° 59'.6; cupola on Municipal Building in Bahia Blanca, 184° 43'.8; right-hand edge (near top) of brick chimney near grain elevator, 339° 24'.2; tip of left-hand one of two apparently overlapping water towers at the port of Engineer White, 354° 47'.9.

Colonia Las Heras, Santa Cruz, 1933.--Proximate reoccupation of CIW stations of 1919 and 1925 (exact reoccupation impractical because of growth of town and encroachment of corrugated iron buildings), about 800 meters northwest of former stations, across railroad from town, on grazing land north of cemetery, 66.5 meters north of northwest corner post of cemetery and in line with west fence; marked by cross cut in top of rough native stone about 6 by 7 by 20 inches (15 by 18 by 50 centimeters) projecting about 3 inches (8 centimeters) aboveground. True bearings: spike

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Argentina--continued

over center of red-roofed house in town, about 650 meters, 25° 00'.4; spike on top of railroad water tank, 550 meters, 321° 05'.6; spike on left end of high warehouse by railroad, about 320 meters, 343° 02'.4.

Dolavon, Chubut, 1933.--Close reoccupation of CIW station of 1919, several hundred meters northwest of town, south of cemetery across railroad, 57.3 meters south-southwest of south corner of cemetery fence, and 48.8 meters from a point which is 30.0 meters southeast of cemetery corner post measured in line of fence along road; marked by cross cut in top of a large native stone 8 by 8 by 22 inches (20 by 20 by 56 centimeters) projecting about 3 inches (8 centimeters) aboveground. True bearings: peak of nearer gable of large railroad warehouse at west end of town, about 550 meters, 6° 35'.9; peak of gable on brick house at east end of town, about 500 meters, 296° 04'.7; middle of M in CMC (Chubut Mercantile Company), about 450 meters, 314° 11'.9; wooden spike on right gable of flour mill by railroad where road crosses railroad, about 400 meters, 318° 22'.2; small wooden spike over left gable of corrugated iron house near west end of town, about 450 meters, 349° 08'.7.

La Quiaca, Jujuy, 1932.-- Intercomparison observations were made at the observatory of the Argentine Meteorological Service between CIW magnetometer inductor No. 26 and the observatory standards. Declination and horizontal-intensity observations were made at the magnetometer pier (the most easterly pier in the absolute building) and a point outside designated as station D, 10.55 meters from the center of the magnetometer pier. Inclination observations were made in the absolute building using the southwest and northwest piers. From the magnetometer pier the observatory azimuth mark bears 263° 49'.4; and from station D an auxiliary declination-mark bears 281° 26'.3.

Mendoza, Mendoza, 1932.-- Two stations were occupied. Station A was in Parque San Martin near the Argentine Meteorological Office station of 1914 and CIW station of 1917 and 1926, almost due east of a confiteria and in line with south side of confiteria, 65 meters east of drive in front of confiteria, 41 meters southwest of a second curving drive, 45.1 meters southwest-by-west from a Lombardy poplar tree which stands about 15 meters inside of line of lower trees and shrubbery, 41.0 meters northeast of a double bushy tree, and 11.4 meters south of a small irrigation ditch; marked by cross in top of stone post about 16 by 16 by 40 centimeters set flush with ground. True bearings: vertical bar of letter L in word "DEL" in sign "Restaurant y Confiteria del Parque", 81° 24'.1; ornament on bandstand, 308° 40'.3.

Station C was about 0.75 kilometer south and a little east of A, toward the southern part of Parque San Martin, about 300 meters west-by-south from boathouse and restaurant on west side of lake in park, 46 meters south of a slightly curving driveway branching almost at right angles from the main driveway directly in front of boathouse, 27.4 meters southwest of a Carolina poplar tree, 34.0 meters nearly south of a pine tree which stands 12.0 meters from edge of driveway and 16.8 meters from the poplar tree; marked by cross cut in top of large stone with somewhat rounded upper surface and projecting about 6 centimeters aboveground. True bearings: base of upraised arm of figure on monument, 1 kilometer, 107° 44'.2; base of staff on small left-hand tower, 251° 29'.2; base of staff on main tower of boathouse and restaurant, 252° 14'.9; base of staff on right-hand tower, 253° 17'.8.

Mercedes, Buenos Aires, 1932.--Near CIW station B of 1925 which could not be located exactly because of flooded land due to recent heavy rain, on property of Senor Bernardo Rocca, about 600 meters southwest of barracks, in middle of driveway, about 300 meters from entrance gate, and 11.00 meters from fence along western side of property; not marked. True bearings: flagpole on large house, 1° 06'.4; cathedral spire, 216° 17'.5; tall church spire (new), 235° 46'.8; tip of water tank at barracks, 274° 53'.7.

Pilar, Cordoba, 1932, 1933.-- A complete set of intercomparisons was made at the Pilar Observatory of the Argentine Meteorological Service between CIW magnetometer inductor No. 26 and the observatory instruments Kew magnetometer No. 175 and Eschenhagen inductor No. 3. Following this another complete set was secured between CIW magnetometer inductor No. 26 and CIW-type magnetometer inductor No. 105 made by the Precise Instrument Company of Brooklyn, New York, for the Argentine Meteorological Service. The stations used were piers B and D5 for declination and horizontal intensity and piers B and D2 for inclination. The observatory azimuth mark at corner of tennis court bears 100° 13'.1 from station B and 94° 36'.1 from station D5.

Puerto Deseado, Santa Cruz, 1933.--Two stations were occupied. Station A was exact reoccupation of CIW station A of 1925, in open field up the hill from meat-packing plant, 90 paces from corner post at end of Calle Manzana, and 105 paces northwest of fence enclosing field in which there were two small houses; marked by cross cut in top of stone projecting about 2 inches (5 centimeters) aboveground, visible part of stone being shaped like truncated cone. True bearings: coast beacon light across Deseado River, about 5 miles (8 kilometers), 0° 32'.6; top end of water gauge on railroad water tank, about 0.50 mile (0.8 kilometer), 9° 31'.9; lighthouse on Penguin Island, about 10 miles (16 kilometers), 326° 12'.8; weathercock on right end of carbarn in railroad yards, 400 yards (350 meters), 348° 08'.6.

Station B was 217 paces northwest of A, in line with A and Penguin Island lighthouse, in line with center line of Calle Maipu, and 54.8 meters southwest of a steel angle iron stake locating a property corner; marked by a cut stone, 8 by 8 by 22 inches (20 by 20 by 56 centimeters) set in a concrete foundation which projects about 2 inches (5 centimeters) aboveground, a 0.25 inch (0.6 centimeter) hole in center of top indicating exact spot. True bearings: base of tall tubular radio mast near electric light plant, 61° 59'.6; Penguin Island lighthouse, 326° 12'.8; beacon light on coast across Deseado River, about 5 miles (8 kilometers), 359° 11'.6.

Puerto Madryn, Chubut, 1933.--Two stations were occupied. Station A was practical reoccupation of CIW stations A and B of 1925, about 1 mile (1.6 kilometer) north of town, 90.7 meters northwest of corner post of fence surrounding new water tank, and 78 meters due west of station B of 1925, near edge of a low valley that crosses the plain at this point; as the water tank was viewed from station A, the right edge of the tank-support appeared to cut in half the window in the small brick house behind the tank; marked with a long quebracho peg driven flush with ground surface. True bearings: beacon light on shore of gulf, about 2 miles (3 kilometers), 194° 45'.5; cross on domed tomb in cemetery across

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low valley, about 0.50 mile (0.8 kilometer), 205° 38′.3; breather pipe on oval-shaped elevated oil tank in railroad yard, about 0.75 mile (1.2 kilometer), 321° 42′.1; spike on tower of tall house, 0.50 mile (0.8 kilometer), 339° 45′.2.

Station B was about 1.5 mile (2.5 kilometers) north of town, on flat shrubby ground between the cemetery and the Gulf of Madryn, in line with north fence of cemetery, 94.3 meters from cemetery corner post, about 45 paces from edge of low cliff overlooking the gulf; marked by cross cut in top of a roughly squared stone about 4 by 4 by 18 inches (10 by 10 by 45 centimeters) projecting about 2 inches (5 centimeters) aboveground. True bearings: spike on round tower of tall house, about 1.2 mile (2 kilometers), 8° 31′.5; left edge of round cap on new town water tank, about 0.50 mile (0.8 kilometer), 24° 07′.3; coast beacon to north, about 1.5 mile (2.5 kilometers), 190° 30′.9; gable of white house in group to left along coast, about 3 miles (5 kilometers), 336° 13′.7.

Santa Cruz, Santa Cruz, 1933.-- Two stations were occupied. Station A was close reoccupation of CIW stations of 1919 and 1925, in Plaza San Martin, southwest of main part of town, 46.35 meters from south corner of monument base, 33 and 48 meters, respectively, from the southwest and southeast fences which enclose plaza, and 25.85 meters from south corner of windmill base; marked by a rounded stone, about twice the size of a man's head, buried with top surface about 6 inches (15 centimeters) below ground surface, a lightly-chipped cross on top indicating the exact spot. True bearings: large cross on high bluff south of town, about 3 miles (5 kilometers), 0° 58′.5; cross on church spire, about 400 meters, 225° 22′.0; rim on right side of clock on same church tower, 225° 26′.2; cross on top of rounded tomb in cemetery, near cemetery gate, 1 mile (1.6 kilometer), 356° 16′.4.

Station B was close reoccupation of CIW station B of 1925, southwest of town, on west side of road leading to town, about 400 yards (350 meters) northwest of A, 68.5 meters west-northwest of a corrugated iron shed, and 143.2 meters from north corner of fenced football field; marked by a long native stone set with rounded upper end, about 3 inches (8 centimeters) in diameter, projecting about 1 inch (3 centimeters) aboveground, an X chipped in top of stone indicating exact spot. True bearings: center of top of windmill tower on Plaza San Martin, near station A, 300° 47′.9; cross on rounded tomb in cemetery near gate, 345° 50′.5; large cross on high bluff south of town, about 3 miles (5 kilometers), 357° 29′.7.

Bolivia

Cachuela Esperanza, Beni, 1932.--West of the settlement of Suarez Hermanos, on south bank of Beni River, south of the ship repair yard maintained by the firm; 100.4 feet (30.60 meters) south of the southeast corner of wire-fenced enclosure of the repair yard, 157.0 feet (47.85 meters) south of southeast corner of living quarters on yard ground, 216.6 feet (66.02 meters) southwest of the northwest corner of the most westerly house in the settlement proper; marked by cement block 8 by 8 inches (20 by 20 centimeters) projecting 1.5 inches (4 centimeters) aboveground, lettered "CIW 1932," a drill hole marking exact center. True bearings: fork in tree on opposite bank of river, 173° 55′.4; tip of spark screen on power plant smokestack, 246° 21′.3; tip of water tank near residence of Nicolas Suarez, about 800 yards (0.75 kilometer), 274° 47′.5.

Guayaramerin, Beni, 1932.-- Two stations were occupied. Station A was a close reoccupation of CIW station of 1924 being about 50 feet (15.24 meters) to eastward of the former location; in orange grove in front of house owned by Dr. Lima, Brazilian consul, and now occupied by Brazilian Customs Agent, east of the village proper at end of an avenue of mango trees, 44.8 feet (15.85 meters) east of wire fence bounding Dr. Lima's property, 20.8 feet (6.34 meters) south of second orange tree from the fence in row to north, and 50.2 feet (15.30 meters) northwest of northwest corner of the house; marked by stone about 4 by 6 inches (10 by 15 centimeters) projecting about 1 inch (2.5 centimeters) aboveground, lettered "CI," a cross between the letters marking the exact spot. True bearings: left edge of window frame of house about 400 yards (366 meters) distant, 58° 57′.7; east gable of thatch-roofed house, 71° 15′.9; east gable of large tin-roofed building in the village, about 250 yards (229 meters) distant, 161° 43′.9.

Station B was about 500 yards (457 meters) west of A, near southeast corner of football field, 22 paces east of east margin of playing area, 10 paces northeast of path leading diagonally across field, 105.8 feet (32.25 meters) west of southwest corner of nearest house eastward, 106.9 feet (32.58 meters) northwest of northwest corner of next house south in the same row, 123.4 feet (37.61 meters) north of northeast corner of most easterly house of a row facing south end of field; marked by a stone about 3 by 7 inches (7.5 by 18 centimeters) projecting 1 inch (2.5 centimeters) aboveground, lettered "CI," a cross between the letters indicating exact spot. True bearings: center rod of windmill behind military barracks, about 600 yards (550 meters) distant, 157° 56′.7; right edge of window frame in south side of house diagonally across field, 158° 05′.5.

Station B_1, about 400 yards (366 meters) west of B was used as a check station for horizontal intensity only.

La Paz, La Paz, 1932.-- Two stations were occupied. Station A was exact reoccupation of CIW station A of 1917, 1923, and 1924, on grounds of La Paz Golf Club at Alto de La Paz, east of the fairway which lies almost directly in front of clubhouse and opposite the first bunker which is curved in shape, 115 feet (35 meters) from break in bunker at edge of fairway, 90.0 feet (27.45 meters) from east end of bunker, and 54.8 feet (16.71 meters) south of an iron telephone pole (erected in 1930); marked by cross in a firmly embedded native rock projecting slightly aboveground. True bearings: right-hand wireless tower at Viacha (probably not same tower as in 1924 observations), 43° 05′.6; lookout tower at airfield, 115° 24′.4; vertical bar of first letter "L" in "La Paz Golf Club" over door of clubhouse, 184° 06′.7; right-hand edge of railway station, 220° 11′.3; Murillo Monument, now called "Faro del Alto," 296° 13′.3.

Station B was exact reoccupation of CIW station B of 1923 and 1924, on opposite side of fairway from station A and opposite bunker next to the one near station A, 100.9 feet (30.77 meters) from southwest end of bunker, 0.6 meter north of longitudinal axis of bunker extended,

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and 55.8 feet (17.02 meters) from edge of shallow ditch beside graded road; marked by cross in large irregular flat rock, almost flush with ground, and roughly inscribed "CI." True bearings: right-hand wireless tower at Viacha, 43° 10'.8; lookout tower at airfield, 126° 10'.6; telephone pole, 182° 06'.6; vertical bar of first letter "L" in "La Paz Golf Club" over clubhouse door, 198° 42'.1; right-hand edge of railway station, 218° 44'.2; Murillo Monument (or Faro del Alto), 282° 30'.6. Note: For secular-variation purposes this station should be better than A because farther removed from electric carline and iron telephone poles.

Riberalta, Beni, 1932.--Exact reoccupation of CIW station of 1917, in small triangular field owned by Bolivian Holiness Mission, about 300 yards (275 meters) west of the playa, 18 meters east of edge of high bank of Beni River, 32 meters west of small post in front of house in center of east side of field, 93 yards (85 meters) north of a house on south side of field; marked by concrete block about 8 by 8 inches (20 by 20 centimeters), projecting about 1 inch (2.5 centimeters) aboveground, lettered "CIW 1932," a drill hole marking exact spot. True bearings: east radio mast, 21° 40'.2; west radio mast, 26° 35'.8.

Brazil

Abuna, Matto Grosso, 1932.-- Close reoccupation of CIW station of 1917, south of railroad track and west of hotel, on plot of land adjoining hotel grounds, about 71 paces southwest of marker left in 1911 by railroad construction engineers, 7 paces north from edge of riverbank, 37.0 feet (11.28 meters) west of wire fence bounding hotel grounds, 87.0 feet (26.52 meters) east of northeast corner of house to westward; marked by a stone about 7 by 8 inches (18 by 20 centimeters) projecting about 1 inch (2.5 centimeters) aboveground, lettered "CI," a cross between the letters marking exact spot. True bearings: west edge of door frame of church, about 300 yards (275 meters), 187° 37'.3; south gable of hotel, about 100 yards (91 meters) distant, 290° 10'.3.

Annapolis, Goyaz, 1933.--About 2 kilometers north-northeast of town, on west side of road to town, 12.5 meters from southeast corner post of airfield, in line with south boundary of field, 28.8 meters from wire fence on opposite side of road, and 24.6 meters north of a large lobeira shrub; marked by cross cut in squared top of native stone 4 by 6 by 20 inches (10 by 15 by 50 centimeters) set flush with ground surface. True bearings: outside edge of base of fence corner post to south, about 300 meters, 20° 24'.2; chimney on roof-tile factory in town, about 3 kilometers, 36° 55'.2; right edge of small house on top of adjoining ridge to west, about 3 kilometers, 79° 04'.3; right edge of house to east practically in line with south boundary of airfield, about 1.5 kilometer, 278° 58'.2.

Araguari (Araguary), Minas Geraes, 1933.--Practical reoccupation of CIW station of 1915, about 40 paces northwest of former station, in Plaza David Campista, west of meteorological enclosure, 26.0 and 25.9 meters from northwest and southwest corners, respectively, of meteorological enclosure, 23.1 meters from telegraph pole to northeast, and 40 and 58 paces, respectively, from mud walls on opposite sides of streets to north and west; marked by cross cut in top of smoothly-rounded native stone about 18 inches (46 centimeters) long and 6 inches (15 centimeters) in diameter, set flush with ground surface. True bearings: lightning arrester on top of tower of Goyaz railroad station, about 1.5 kilometer, 68° 26'.3; bottom of southeast corner of corner store to northeast, about 75 meters, 236° 14'.9; ball on top of left spire on large church, about 1.5 kilometer, 324° 57'.7; ball on top of right spire on same church, 325° 41'.6.

Bahia, Bahia, 1931.--Two stations were occupied. Station A was close reoccupation of CIW station A of 1923, about 3 kilometers south of city, on road to suburb called Rio Vermelho, on grounds of meteorological station, east of buildings, in roadway between experimental plots of land, 78.0 feet (23.79 meters) east of northeast corner of living quarters, 32.5 feet (9.91 meters) and 47.2 feet (14.40 meters), respectively, from the bases of concrete electric-light poles; marked by cross in flat top of rough stone buried 4 inches (10 centimeters) below surface of ground. True bearings: central ornament on small church, 0.75 mile (1.2 kilometer), 159° 51'.7; cross on large church, 1 mile (1.6 kilometer), 171° 09'.4; central ornament on small (old) church, 0.33 mile (0.5 kilometer), 275° 26'.6.

Station B was exact reoccupation of CIW station B of 1923, about 130 yards (120 meters) west-southwest of A, near southwest corner of meteorological station grounds, in unused driveway passing along west side of residence building, 94.7 feet (28.88 meters) south of southwest corner of residence building, 17.9 feet (5.46 meters) southwest, 20.0 feet (6.10 meters) southeast, and 10.9 feet (3.32 meters) northeast, respectively, from three eucalyptus trees; marked by rough stone buried 5 inches (13 centimeters) below ground, a chiseled notch in upper sharp edge indicating exact spot. True bearings: cross at south end of São Lazeru Church, 72° 15'.2; cross at north end of São Lazeru Church, 73° 38'.0; central spire of large church, 132° 27'.5.

Barcellos, Amazonas, 1932.-- Two stations were occupied. Station A was an exact reoccupation of CIW station A of 1924, in the village on right bank of Rio Negro, northeast of and across the road from the church of the Salisian Mission, 53.4 feet (16.28 meters) northeast of large almond tree, 110.9 feet (33.80 meters) northeast of northwest corner of church tower; marked by concrete block 8 by 8 inches (20 by 20 centimeters) lettered "CIW 1924," and extending 1 inch (2.5 centimeters) aboveground, a brass cartridge set in the concrete marking exact spot. True bearings: northeast corner of house just beyond station B and first house west of church, 116° 18'.1; station B, 121° 32'.2; south edge of door frame of house across a creek, 299° 43'.4.

Station B was a close reoccupation of station B of 1924, the station marker having been removed. On a small knoll about 200 feet (61 meters) northwest of A, about 25 feet (7.5 meters) south of riverbank, 47.6 feet (14.51 meters) northeast of northeast corner of first house northwest of Salisian Church, 126.2 feet (38.47 meters) northeast of the northeast corner of the next house to the northwest; marked by rough stone about 6 by 6 inches (15 by 15 centimeters) projecting about 1.5 inches (4 centimeters) aboveground, a cross marking exact spot. True bearings: south edge of door frame

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of most northerly house beyond bridge, 300° 15′.1; station A, 301° 32′.2.

Boa Vista, Amazonas, 1932.--Two stations were occupied. Station A was a close reoccupation of CIW station of 1913, on northwest bank of Rio Branco on highest part of open space in front of buildings in south part of town; 34 paces north of top of riverbank, 56.0 feet (17.01 meters) south of large prominent tree, 154.9 feet (47.21 meters) southeast of southeast corner of nearest residence; marked by concrete post 8 by 8 inches (20 by 20 centimeters) at top, projecting 1 inch (2.5 centimeters) aboveground, lettered "CIW 1932." True bearings: nearest gable on higher part of roof of dried meat factory, 23° 13′.8; flagpole in front of police station, 45° 53′.7; tip of south radio tower, 0.50 mile (0.8 kilometer), 209° 28′.2; highest peak at south end of most northerly range toward southeast, 318° 36′.8.

Station B was 235 paces east of A, on open ground between the town and Rio Branco, south of south end of Avenida Sebastião Diniz, 35 paces north of the riverbank, 150.6 feet (45.90 meters) from southeast corner of house on west side of Avenida Sebastião Diniz, 142.9 feet (43.56 meters) from southwest corner of same house; marked by concrete block 8 inches (20 centimeters) square at top, projecting 1 inch (2.5 centimeters) aboveground, lettered "CIW 1932." True bearings: nearest gable on higher part of dried meat factory, about 0.50 mile (0.8 kilometer), 24° 34′.0; flagpole in front of police station, about 380 yards (357 meters), 34° 57′.4; tip of south radio mast, 209° 08′.6; highest peak of most northerly range toward southeast, about 6 miles (9.5 kilometers), 319° 06′.4.

Bocca do Jutahy, Amazonas, 1932.-- Close reoccupation of CIW station of 1924, on south bank of Amazon (Solimoens) River, west of a small stream crossed by a bridge, 35 paces north of second house west of the bridge, between edge of riverbank and pathway leading to post office and fuel station.

Caracarahy, Amazonas, 1932.-- Probably a practical reoccupation of CIW station of 1913, near main part of village about 0.25 mile (0.4 kilometer) south of government radio station, in open space west of only house in vicinity near the river; about 100 yards (91 meters) west of top of riverbank, 247.0 feet (75.29 meters) from southwest corner of house mentioned, 204.7 feet (62.39 meters) from northwest corner of shed just south of the house, 135.8 feet (41.39 meters) north of stockade cattle run leading to river, 116.2 feet (35.42 meters) east of wire fence along street; marked by stone about 5 by 7 inches (12 by 18 centimeters) projecting about 1.5 inches (4 centimeters) aboveground, lettered "CI," a cross between the letters indicating exact spot. True bearings: highest point in Cerro Caracarahy about 8 miles (13 kilometers) distant, 166° 55′.8; tree on opposite bank of river, 261° 33′.6.

Catalão, Goyaz, 1933.-- Three stations were occupied. Station A was close reoccupation of CIW stations A and B of 1925, about 0.50 kilometer southeast of railroad station, 35.8 meters from southwest corner of meteorological enclosure, 12.5 meters from nearest point of mud wall to west, and 21.1 meters from inside corner of mud wall to southwest; marked by cross cut in top of a roughly-dressed native stone 20 inches (50 centimeters) long and more than 6 inches (15 centimeters) in diameter, projecting about 1 inch (2.5 centimeters) aboveground. True bearings: bottom of middle one of three crosses on high hill south of town, about 1 kilometer, 36° 40′.8; cross on tomb in cemetery, about 2 kilometers, 128° 33′.3; cross planted in front of Chapel of St. John on hill, about 3 kilometers, 184° 12′.5; small cross on front gable of same chapel, 184° 49′.2.

Station B was 18.1 meters east of A, and 30.7 meters from southwest corner of meteorological enclosure; marked by stone post similar to that marking station A, and projecting about 0.50 inch (1 centimeter) aboveground. True bearings: left edge of base of chimney of rice-cleaning plant, about 500 meters, 160° 13′.7; cross planted in front of Chapel of St. John, 183° 40′.7; cross on roof of same chapel, 184° 17′.4; gable of white house on long slope into valley, about 4 kilometers, 246° 12′.5.

Station C was about 1 kilometer northwest of railroad station, in open field, 24.2 meters due south of east corner of cemetery, 22.9 meters from second pilaster from corner of cemetery wall, 31 paces from edge of road leading to cemetery gate, 4 meters from anthill to the south-southwest, and 7 meters from anthill to northeast; marked by cross in top of native stone about 6 by 8 by 20 inches (15 by 20 by 50 centimeters) projecting slightly aboveground. True bearings: base of southwest corner of cemetery wall, 73° 15′.2; cross planted in front of Chapel of St. John, about 3 kilometers, 222° 59′.0; cross on central spire of large church in town, about 1 kilometer, 338° 00′.7; peak of gable on right end of men's school to south, about 0.50 kilometer, 359° 10′.5.

Clevelandia, Para, 1931.--On the Oyapock River about 8 miles (13 kilometers) above St. Stephens, on grounds of the wireless station, 48.3 feet (14.73 meters) northwest of wireless mast, 92.0 feet (28.06 meters) from north corner of the office, and 376 meters east-by-south from flagstaff set in concrete at the small wharf; marked by a concrete monument designating a geographical position established by the Rondon Boundary Commission in 1927. True bearings: cross on church, 100° 05′.8; flagstaff at wharf, 106° 36′.0; tall straight palm tree, 0.50 mile (0.8 kilometer), 179° 52′.3.

Cucuhy, Amazonas, 1932.--Two stations were occupied. A close reoccupation of CIW station of 1913; behind the guardhouse of the Cucuhy garrison, 116.3 feet (35.45 meters) southeast of the southeast corner of the Comandante's residence, 92.5 feet (28.19 meters) northeast of the southeast corner of the guardhouse kitchen, 157.9 feet (48.13 meters) northeast of the northwest corner of the next house south of the guardhouse; marked by stone, roughly about 5 by 8 inches (12 by 20 centimeters) on top, projecting about 2 inches (5 centimeters) aboveground, lettered "CI," having a cross cut between the letters marking the exact spot. True bearings: northwest corner of first house south of guardhouse, 55° 55′.1; tree on opposite bank of river, 66° 19′.2; sharp peak on Mt. Cucuhy, 201° 28′.6.

Station B is 212.5 feet (64.77 meters) northeast of A, 244.5 feet (74.52 meters) from the southeast corner of the house just north of the residence of the Comandante; marked by stone, roughly 6 inches (15 centimeters) square, projecting 2 inches (5 centimeters) aboveground, lettered "CI," a cross between the letters marking

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exact spot. True bearings: fork in prominent tree, 11° 44′.2; northwest corner of house just south of the guardhouse, 62° 23′.2.

Esperança, Amazonas, 1932.--On south bank of Amazon (Solimoens) River near the mouth of the Javary, on football field between village and river, 25 paces west of path leading to river from the village, 42 paces south of south edge of deep gully near river; marked by wooden peg driven flush with ground. True bearings: northwest corner of office at radio station, 312° 11′.7.

Goyaz, Goyaz, 1933.-- Two stations were occupied. Station A was close reoccupation of CIW station A of 1915 and 1925, in the central square of town (Praca 24 de Outubro, or Largo do Chafariz), on west side of road passing through square, 31.5 meters from nearest corner of stone wall of fountain; 14.5 meters from nearest electric-light pole, and 14.6 meters from third tree south of the one opposite fountain corner; marked by a quarter-inch hole in top of an arueira block 8 by 8 by 21 inches (20 by 20 by 50 centimeters), arueira being a very hard Brazilian wood which does not decay. True bearings: right edge under roof of higher part of school across square, 75 meters, 132° 23′.7; cross planted in front of Chapel of Santa Barbara on hill, about 1.5 mile (2.5 kilometers), 149° 54′.8; center of head of figure on church, about 1 kilometer, 178° 41′.7; peak of small top gable on military barracks across square, about 100 meters, 191° 13′.3; bottom of left edge of stone wall of fountain, 231° 39′.1.

Station B was close reoccupation of CIW station B of 1925, about 1.5 mile (2.5 kilometers) northwest of A, at foot of hill on which stood Chapel of Santa Barbara, 34.3 meters from last telegraph pole before base of hill was reached, and 7.7 meters from bottom of small tree at foot of path to chapel; marked by a rough cross cut in roughly-rounded top of a large native stone set flush with ground surface. True bearings: middle of base of cross in front of chapel on hill, 128° 22′.8; left edge of fountain stonework in town square, 1.5 mile (2.5 kilometers), 329° 25′.2; small spire to left of side gable of Evangelical Church across main plaza, about 1.5 mile (2.5 kilometers), 331° 09′.2; left edge of narrow building on south side of plaza occupied by Department of Hygiene, 1.5 mile (2.5 kilometers), 331° 35′.8.

Guayara Mirim, Matto Grosso, 1932.--Very close reoccupation of CIW station of 1924, in eastern part of public square opposite new church, just south of path leading across the square, 166.1 feet (50.63 meters) from the southeast corner of a house facing the northerly side of the square, 102.1 feet (31.12 meters) from northeast corner of iron fence facing southerly side of square, 40.8 feet (12.42 meters) from fence along easterly side, and 60.8 feet (18.53 meters) from fence along southerly side of square; marked by cement block 8 by 8 inches (20 by 20 centimeters) lettered "CIW 1932," projecting 1 inch (2.5 centimeters) aboveground, a drill hole marking exact spot. True bearings: tip of wooden water tank, 23° 07′.1; northeast corner of stone house near tank, 26° 04′.9; southeast corner of house facing west side of square, 123° 57′.1; cross on church, 309° 04′.2.

Manãos, Amazonas, 1932.--Four stations were occupied. Station A was a close reoccupation of CIW stations I of 1914, 1917, and 1918, and of station A of 1924, in the suburb known as "Morro dos Educanos," between the edge of the river bluff and the red house known as "Villa Cavalcante;" 60.5 feet (18.44 meters) west of the gate to the Villa, 39.4 feet (12.01 meters) north of a telephone pole, 42.0 feet (12.80 meters) southeast of a house on edge of bluff; station not marked. True bearings: right edge of red house, 115° 43′.6; tip of most prominent church tower, 123° 23′.0; flagpole on house on distant hilltop, about 2 miles (3 kilometers), 349° 45′.6.

Station B was a close reoccupation of stations II of 1913 and 1918 and an exact reoccupation of station B of 1924, in the plaza in front of the Instituto Benjamin Constanté and directly in front of a chalet having elaborate marble gateposts; 201 feet (61 meters) from the wall of the Instituto Benjamin Constante, 102 feet (31.1 meters) from the more northerly of the two gateposts mentioned, 96.2 feet (29.32 meters) from the southeast corner of a wall around nearest house to northwest; marked by cement block 6 by 6 inches (15 by 15 centimeters) on top, 20 inches (51 centimeters) long, 16 inches (40 centimeters) square at lower end and set flush with surface of ground, a drill hole marking exact spot. True bearings: tip of dome on opera house, 16° 33′.9; center of central ornament on Instituto Benjamin Constante, 162° 07′.9; steeple of nearby church, two blocks distant, 342° 52′.5; center of iron gate across street south of plaza, 357° 41′.9.

Station C was on the east bank of the river inlet passing under Ponte Egarapé do Manãos, about 300 yards (275 meters) north of this bridge, 162.8 feet (49.44 meters) north of the last of a line of street lamps between the inlet and a wide unimproved road, 48.6 feet (14.81 meters) west of a gate in a barbed-wire fence enclosing a large estate; station not marked. True bearings: northwest corner of Villa Cavalcante, 13° 24′.8; tip of small tower west of bridge, 34° 44′.0; flagpole on house beyond inlet, 122° 52′.5.

Station D was about 5 miles (8 kilometers) northwest of the city and just north of the old long-wave radio station, now abandoned. In natural clearing caused by outcropping of coarse gray sand and crossed by automobile road to radio station, about 12 yards (11 meters) northwest of center of road, 131.7 feet (40.14 meters) southeast of southeast corner of schoolhouse, 156.2 feet (47.61 meters) east of the northeast corner of the center one of three houses within the clearing; marked by marble slab about 2 by 8 inches (5 by 20 centimeters) lettered "CI," and projecting about 1.5 inches (4 centimeters) aboveground, a cross between the letters indicating exact spot. True bearings: west gable of abandoned factory building, about 500 yards (457 meters) distant, 25° 04′.1; tip of old radio mast, 27° 37′.7; tip of telephone pole south of houses in the clearing, 49° 40′.1; fork in large lone tree about 200 yards (183 meters) distant, 299° 46′.9.

Natal, Rio Grande do Norte, 1931.-- The station of 1919 no longer being suitable for occupation, a new station was established about 0.75 mile (1.2 kilometer) due north of the old site, on land belonging to the government but leased to a German Aereo Service for use as a radio station, 234.3 feet (71.46 meters) southeast of north radio mast, 141.0 feet (43.00 meters) from northeast corner of small dwelling to southwest, and 31 feet (9.5 meters) from middle of path leading to small chapel about 200 yards (180 meters) distant; marked by cross in stone post 8 by 8 by 24 inches (20 by 20 by 61 centimeters) set flush with ground. True bearings: signal staff

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on Matrice Church, 17° 34'.1; tip of tower on new customhouse or "alfondega," 18° 41'.2; tower on Governor's palace, 18° 57'.7; base of north radio mast, 129° 53'.2; cross on small chapel across river, 167° 51'.2; light on old fort at harbor entrance, 226° 24'.8; cross on small chapel, 200 yards (180 meters), 298° 43'.5.

Obidos, Para, 1932.--Two stations were occupied. Station A was a very close reoccupation of CIW station of 1923, on the Playa do Bom Jesus, 315.5 feet (96.16 meters) almost directly in front of and southwest of the gate of the barracks, 145.6 feet (44.39 meters) northeast of the southeast corner of a house at corner of Justo Chermont and Santa Anna Streets, 50.7 feet (15.45 meters) south of a telephone pole, in line with center of barracks door and corner of a building visible through this door from within. The station was newly marked with a concrete block 8 by 8 inches (20 by 20 centimeters) projecting 1.5 inch (4 centimeters) aboveground, lettered "CIW 1932," a drill hole marking exact spot. True bearings: cross on Bom Jesus Church, 130° 38'.2; pyramid on barracks wall, 189° 03'.4; left corner of barracks, 199° 21'.8; right corner of barracks, 231° 06'.6.

Station B was a close reoccupation of station B of 1923, being about 75 feet (23 meters) eastward from the former location. On high bank of Amazon River, north of football field facing Santa Anna's Church, and about 0.10 mile west of A, in depression between small bare knoll and larger knoll to south; 151.8 feet (46.27 meters) southwest of southwest corner of nearest house of a row to northeast, 223.4 feet (68.09 meters) west of northeast corner of military prison, 55.0 feet (16.76 meters) southeast of a barbed-wire fence; marked by a concrete block 8 by 8 inches (20 by 20 centimeters) at top, projecting about 1.5 inch (4 centimeters) aboveground, lettered "CIW 1932," a drill hole marking exact spot. True bearings: cross on Bom Jesus Church on hill, 207° 48'.7; northwest corner of most southerly house on east side of square, 232° 05'.4; cross on Santa Anna's Church, 243° 28'.9.

Pernambuco, Pernambuco, 1931.--Three stations were occupied. Station A was about 6 miles (10 kilometers) southwest of the city, on the airfield of the French "Aereopostale" Company, 569.5 feet (173.70 meters) southeast of the south corner of the hangar, 561.6 feet (171.29 meters) from south corner of the staff quarters, 55.8 feet (17.02 meters) from a low post bearing a field light, and 54.4 feet (16.59 meters) from the next post southward from the light-bearing post; marked by a hardwood stake 18 inches (46 centimeters) long and 2 inches (5 centimeters) in diameter driven 2 inches (5 centimeters) below the surface of the very sandy soil. True bearings: staff on hangar supporting wind indicator, 164° 14'.4; center of gasoline pump at right-hand corner of hangar, 168° 34'.8; third electric-light pole (concrete) from hangar, 213° 16'.3.

Station B was about 5 kilometers west of the city, on the "Campo do Zepplin" owned by the government, 751.3 feet (229.15 meters) northwest from the center of the mooring mast, 203.3 feet (62.01 meters) from the middle of a circular track of iron rails surrounding the mooring mast, and 45.5 feet (13.88 meters) from the middle of a drainage ditch to the northwest; marked by a rough stone post 7 by 7 by 18 inches (18 by 18 by 46 centimeters) projecting about 1 inch (2.5 centimeters) aboveground. True bearings: tip of water tank at oil factory, 1 mile (1.6 kilometer), 11° 54'.1; chimney of jute factory, 2 miles (3 kilometers), 195° 32'.8; center of mooring mast, 299° 54'.6; chimney of brick factory, 0.75 mile (1.2 kilometer), 338° 10'.7.

Station C was about 1 mile (1.6 kilometer) due west of CIW stations A and B of 1923, on grounds of the Jockey Club, in southwest part of race track oval, 121.5 feet (37.06 meters) from the 800 meter pole, 83.5 feet (25.47 meters) from the 850 meter pole, and 132.8 feet (40.50 meters) from the foot of a large double tree; not marked. True bearings: center of brick chimney on factory, 161° 26'.0; middle gable of grandstand, 212° 12'.4.

Pinheiro, Para, 1931.--Exact reoccupation of Brazilian Magnetic Commission station of 1903 and CIW station of 1910, 1911, 1914, 1915, 1918, 1919, and 1923, in front of St. Sebastian Church, 69.5 meters west of its southwest corner, 62.8 meters north of near side of shore end of Government wharf, and about 10 meters east of edge of steep riverbank; marked by a cross in top of a concrete-block post projecting about 18 centimeters aboveground. True bearings: new chimney in Pará near steel water tank, 1° 35'.8; cupola on triple Pará water tanks, 2° 49'.2; right-hand spire of cathedral, 5° 21'.9.

Porto Velho, Amazonas, 1932.--Two stations were occupied. Station A was an exact reoccupation of CIW station of 1924, east of steel water tanks behind manager's house and west of Catholic Cathedral, 132 paces northeast of northeast corner of Hotel Brazil, 296.0 feet (90.22 meters) southeast of most easterly steel tank, 215.8 feet (64.78 meters) east of wire fence, 261.0 feet (79.55 meters), and 165.6 feet (50.48 meters), respectively, from wire fences toward north and east; marked by concrete block projecting about 3 inches (8 centimeters) aboveground, lettered "CIW 1924," the exact spot being indicated by a brass cartridge set flush with the concrete. True bearings: east gable of Hotel Brazil, 10° 35'.9; east radio mast, 150° 04'.8; tip of Independence Monument, 150 yards (137 meters) distant, 300° 46'.4; cross on small church, about 800 yards (732 meters) distant, 324° 00'.2.

Station B was an exact reoccupation of 1924, 411.7 feet (125.48 meters) north and eastward from A and in line between A and the east radio mast; 77.6 feet (23.65 meters) west of a palisade fence, 42.0 feet (12.80 meters) east of southeast corner of fenced enclosure, 109.5 feet (33.38 meters) northeast of more westerly of two lampposts made of iron rails, 89.0 feet (27.13 meters) northwest of second lamppost; marked by concrete block about 8 by 8 inches (20 by 20 centimeters) set flush with ground, lettered "CIW 1924," the exact spot being indicated by a brass cartridge set flush in the concrete. True bearings: east radio mast, about 600 yards (550 meters) distant, 150° 03'.0; tip of Independence Monument, 317° 18'.0; cross on small church, 324° 58'.8; east gable of Hotel Brazil, 349° 39'.8.

San Gabriel, Amazonas, 1932.--About 0.75 mile (1.2 kilometer) east of main part of village, just west of storehouse of GONÇALVEZ IRMÃOS, between path from village and large natural boulder about 6 by 20 feet (2 by 6 meters), 10.1 feet (3.08 meters) south of a cross cut into this boulder, 91.3 feet (27.83 meters) from northwest corner of house just north of the storehouse, 50 yards (46 meters) north of the riverbank; marked by a cross on a rough triangular stone. True bearing: prominent tree on island in river, 29° 28'.4.

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Santa Isabel, Amazonas, 1932.--Two stations were occupied. Station A was an exact reoccupation of CIW station of 1924 and close reoccupation of station of 1913. On Tapuraquara Island opposite village of Santa Isabel; on cleared ground 216.0 feet (65.84 meters) east of the kitchen of a new house, 102.0 feet (31.09 meters) south of large tree, about 52 yards (48 meters) southeast of another large tree; marked by concrete block 7 by 7 inches (18 by 18 centimeters) on top, lettered "CIW 1924" projecting about 1.5 inches (4 centimeters) aboveground, exact point indicated by a brass cartridge set in the concrete. True bearings: near gable of kitchen of new house, 83° 08'.7; tree on opposite bank of river, 92° 58'.8.

Station B was on the east bank of the river about 150 yards (137 meters) south of the store building of J. G. Araujo Company's trading post; 116.6 feet (35.54 meters) east of center of path leading along the river south from the post, 153.4 feet (46.76 meters) west of a large tree, and 252.0 feet (76.81 meters) north of another large tree; marked by a stone roughly diamond-shaped, 4 by 4 by 6 by 6 inches (10 by 10 by 15 by 15 centimeters) projecting about 1 inch (2.5 centimeters) aboveground, a cross cut in upper surface marking exact spot. True bearing: south gable of house on Tapuraquara Island, 41° 01'.8.

Santarem, Pará, 1932.--Two stations were occupied. Station A was an exact reoccupation of CIW station of 1924, in Praza Republicana, west of Concepcion Church, 104.9 feet (31.97 meters) southeast of southeast corner of tile building on north side of praza near river, 140.0 feet (42.67 meters) west of northwest corner of large house on east side of praza, and 119 and 117 feet (36.3 and 35.7 meters), respectively, from two large trees to the south and south-southeast. The old marker having disappeared, station was newly marked by a stone 3 by 6 inches (7.5 by 15 centimeters) at top (larger at bottom) projecting 1.5 inches (4 centimeters) aboveground, top lettered "CI," a cross between the letters marking exact spot. True bearings: northeast corner of house west of fence on south side of praza, 48° 20'.0; north gable of Hotel Castello, 229° 16'.2; cross on Concepcion Church, 242° 58'.4; center line of windmill, 295° 04'.0.

Station B was a close reoccupation of CIW station B of 1923, at southern extremity of street called "Travessa Barao do Rio Branco," approximately in line with east fence of convent grounds and 64.3 feet (19.60 meters) south of southeast corner of convent fence, 67.4 feet (20.54 meters) west of cemetery fence; marked by stone about 3 by 8 inches (7.5 by 20 centimeters) at top, projecting about 1.5 inches (4 centimeters) aboveground, lettered "CI," a cross between the letters marking exact spot. True bearings: south gable of convent, 151° 09'.8; cross on Concepcion Church, 171° 28'.6; cross on cemetery chapel, 198° 23'.0.

Vassouras, Rio de Janeiro, 1932.--Simultaneous comparison observations were made at the magnetic observatory between CIW magnetometer inductor No. 26 and the observatory standards, Cooke magnetometer No. 25 and Casella dip circle No. 8075. Piers A and B were used for declination and horizontal intensity, and piers B and C for inclination. True bearings: azimuth pillar from pier A, 146° 40'.7; azimuth pillar from pier B, 148° 04'.1.

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Antofagasta, Antofagasta, 1932.--Station of 1924 could not be reoccupied owing to buildings covering entire area in vicinity of stations A and B. New station located at Panagra Airfield, 10 miles (16 kilometers) southeast of city in direct line, or 17 miles (27 kilometers) by road, just outside boundary of airfield at southeast corner, about 25 feet (8 meters) from corner, 20 feet (6.1 meters) from east boundary line, and 0.8 kilometer southeast of airport buildings; marked by cross in concrete block 11 by 16 inches (28 by 41 centimeters) projecting 6 inches (15 centimeters) aboveground and inscribed "CIW 1932." True bearings: middle ventilator on "Panagra" hangar, 144° 46'.0; left-hand wireless tower at airport, 152° 44'.8; right-hand wireless tower, 156° 25'.8; highest point on mountain range to southeast, 331° 07'.8.

Arica, Tarapaca, 1932.--Station of 1924 could not be reoccupied as entire area covered with buildings. New station located at Panagra Airport, 4 kilometers southeast of former station, on waste desert land west of airport buildings, 70 meters from middle of unimproved road coming from town, 147.5 meters from narrow-gauge railroad, and 506 paces (about 460 meters) west of westerly wireless tower at airport; marked by cross in rounded top of heavy boulder projecting about 2 inches (5 centimeters) aboveground, location being further marked by small cairn close to station. True bearings: telephone pole, 1.5 mile (2.4 kilometers), 13° 35'.4; left-hand wireless tower, 276° 33'.3; left-hand edge of window in office building, 278° 42'.8; right-hand wireless tower, 279° 06'.8.

Magallanes, Magallanes, 1933.--Six stations were occupied. Station A was exact reoccupation of CIW station A of 1925, on hill about 2 miles (3 kilometers) southwest of town, in fenced field at the head of Calle Miraflores, 20.0 meters from fence along road to town, 22.95 meters from station B, and 84.3 meters from station D, in line with B and left-hand one of six radio masts about 5 miles (8 kilometers) to the northeast, and in line with D and right-hand one of two radio masts about 2 miles (3 kilometers) to the northeast; marked by drill hole in a white marble stone (badly worn) planted in 1925. True bearings: left-hand one of six radio masts to northeast, about 5 miles (8 kilometers), 218° 01'.4; cross on church steeple on plaza, about 2 miles (3 kilometers), 230° 10'.4; right edge of top of right-hand one of two radio masts in town, 2 miles (3 kilometers), 244° 52'.7; ball on orphanage steeple, 0.50 mile (0.8 kilometer), 298° 31'.5.

Station B was exact reoccupation of CIW station B of 1925, 22.95 meters southwest of A, in line with A and left-hand one of six radio masts about 5 miles (8 kilometers) to northeast, and 22.5 meters from fence along road to town; marked by a white marble stone (badly worn) planted in 1925. True bearings: left-hand one of six radio masts to northeast, 218° 01'.4; cross on church steeple in town, 2 miles (3 kilometers), 230° 01'.4; ball on steeple of orphanage building, 0.50 mile (0.8 kilometer), 296° 52'.6.

Station C was close reoccupation of CIW station C of 1925, inside racecourse on grounds of Club Hipica of the Sociedad Rural de Magallanes, about 3 kilometers north of main city plaza, in northeast corner of football field, 25.7 meters from east goal post at north end of

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field, 65.45 meters from a marker stone planted by nearest fence along race track, in line between this marker and the outside one of four starting poles on opposite side of track, and 71.6 meters from a point 30 meters down fence from same marker; marked by a 0.25 inch (0.6 centimeter) hole in top of a squared granite stone buried about 3 inches (8 centimeters) below ground. True bearings: crown on figure on church steeple, about 0.75 mile (1.2 kilometer), 39° 39'.5; 600 meter pole on track (red figures), 212° 02'.8; left-hand one of six radio masts to northeast, about 3 miles (5 kilometers), 212° 44'.5; right-hand mast of same group, 219° 50'.9.

Station C.H. was a concrete pillar inside hut used for absolute observations during the polar year 1932-1933, 30 meters northeast of station C, and in line with station C and the right radio mast in group of six. Used with station C for intercomparisons with magnetic instruments of the Chilean Meteorological Service. True bearings: right-hand radio mast in group of six, 219° 50'.9.

Station D was 84.3 meters southwest of A, in line with A and right edge of top of right one of two radio masts in town, 44.3 meters from wire fence to northwest, and 33.5 meters from wire fence to southwest; marked by drill hole in granite stone, 22 inches (56 centimeters) long, set flush with ground surface. True bearings: left-hand radio mast in group of six, about 4 or 5 miles (7 kilometers), 218° 20'.5; cross on steeple of church in town plaza, about 2 miles (3 kilometers), 230° 48'.5; right edge of top of right one of two radio masts on water front, 244° 52'.7.

Station E was close to the variometer building used during the polar year, 1932-1933, 2.33 meters from concrete foundation of variometer building, and 4.30 meters from side wall of patio behind the building; marked by tent peg driven flush with ground surface. True bearings: small cross on front (west) gable of Church of the Salicianos, 0.50 mile (0.8 kilometer), 336° 25'.2; right outside edge of steel railing on little balcony of same church, 338° 32'.4.

Puerto Montt, Chiloe, 1933.-- Three stations were occupied. Station A was close reoccupation of CIW stations A and B of 1925, on Tenglo Island, south of construction works of the Ackermann, Grasau Company, 8.72 meters northeast of northeast corner of large boathouse on shore of inlet, 28 and 24 paces from wire fences to north and east, respectively, and 61 paces south-southeast of the end of a rail fence running south of enclosure in which concrete pontoons are made; marked by hole drilled in top of a granite block, squared at top, and set level with ground surface. True bearings: telephone pole on hill across channel (the one braced by guy wire), 112° 43'.6; downspout on nearest corner of new hospital building on hill, about 2 miles (3 kilometers), 209° 39'.2; flagpole on small hut, about 200 yards (180 meters), 268° 11'.8.

Station B was just inside the north boundary of the city of Puerto Montt, within the enclosure occupied by the city waterworks (Empresa de Agua Potable), on east side of small glade containing a number of old apple trees, about 10 paces from edge of steep slope to southwest, and about 16 paces from end of small ridge on which station was located; marked by a 0.50 inch (1 centimeter) hole in top of a squared granite stone, 8 by 8 by 20 inches (20 by 20 by 50 centimeters), projecting about 0.50 inch (1 centimeter) aboveground. True bearings: church spire on wooded hill, 0.50 mile (0.8 kilometer), 7° 57'.9; gable end of small house on hill, about 300 yards (275 meters), 243° 58'.7; small steeple on San José orphans' school, 0.75 mile (1 kilometer), 290° 31'.7; church spire in city, 0.75 mile (1 kilometer), 323° 31'.8.

Station C was about 80 yards (70 meters) southwest of B, in line with B and gable of small house on hill, south of terrace, and 13 paces north of shrub-covered cliff; marked by a 0.50 inch (1 centimeter) drill hole in top of a granite stone, 6 by 6 by 20 inches (15 by 15 by 50 centimeters) projecting about 0.50 inch (1 centimeter) aboveground. True bearings: gable of small house on hill, about 300 yards (275 meters), 243° 58'.7; far corner of yellow-painted house across narrow valley to east, about 300 yards (275 meters), 264° 00'.9; small steeple on San José orphans' school, 0.75 mile (1 kilometer), 287° 05'.5.

Santiago, Santiago, 1932, 1933.-- Two stations were occupied. Station A was practical reoccupation of CIW station of 1913, 1917, and 1919, on west side of Santiago, on grounds of Quinta Normal, just west of football field, 28.0 meters northeast of most southerly of row of horse-chestnut trees on east side of road through park, 12.0 meters northwest of most easterly of nearby group of trees south of station, and 15.2 meters southeast of a forked pine tree; marked by cross in upper face of large flat slab of stone about 0.45 meter across and 15 centimeters thick buried 15 centimeters below ground. True bearings: right-hand corner of building near northerly wireless tower, 200 meters, 96° 09'.6; end post of a sec tion of guard rail along a walk in park, 163° 22'.9; center of electric-light pole, about 200 meters, 246° 10'.3.

Station B was on grounds of Government meteorological station in Quinta Normal, about 400 meters south of A, in middle of broad brick-bordered walk, 21.3 meters south of center of magnetometer pier in absolute magnetic building; marked by a piece of brass tubing 2 centimeters in diameter and 30 centimeters long, driven almost flush with ground surface. True bearings: church spire (regular observatory mark), 2° 28'.8.

Valparaiso, Aconcagua, 1932.--Two stations were occupied. Station A was exact reoccupation of CIW station of 1917 and A of 1925, about 5 kilometers southeast of Valparaiso, about 300 meters northwest of the Miradero O'Higgins Monument, on well-defined level spot on top of very prominent ridge, 65 meters north-by-west from a sharp curve on new concrete road from city, 7 meters from north edge, 5.5 meters from east edge, 20 meters from south edge, and 8 meters from west edge of the level spot; marked by cross in a rough native stone about 12 centimeters square on top and projecting about 4 centimeters aboveground. True bearings: station B, 145° 35'.8; telephone pole showing above shrubbery to east, at point about 3 meters a-aboveground, 267° 54'.0; top of telephone pole showing above trees just west of monument, 351° 33'.7.

Station B was close reoccupation of CIW station B of 1925, 49.4 meters northwest of A on ground 3 or 4 meters lower than A, in approximate center of ridge, 4.7 meters and 6.6 meters from trees to northwest and southwest, respectively; not marked, stone marker of 1925 could not be found. True bearings: telephone pole beside old road, 296° 29'.3; blaze on tree (declination-mark), 309° 23'.3; station A, 325° 35'.8.

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Colombia

Barranquilla, Bolivar, 1933.--On flat reclaimed land east of the city, almost directly across the ship's channel from the public market; on east bank of channel back of the textile weaving mill and in line with north edge of mill, 144.6 feet (44.07 meters) east of northeast corner of mill, 179.5 feet (54.71 meters) northeast of the southeast corner of mill; marked by cross cut in a stone about 4 by 8 by 14 inches (10 by 20 by 35 centimeters) projecting about 1.5 inch (4.0 centimeters) aboveground, lettered "CI." True bearings: right corner of small shed, about 150 yards (137 meters) distant, 27° 31'.4; right-hand spire of church, about 1 mile (1.6 kilometer) distant, 42° 24'.8; cross on right tower of cathedral, about 1 mile (1.6 kilometer), 87° 38'.6; tip of steel tank, about 400 yards (366 meters) distant, 338° 26'.0.

Bogota, Cundinamarca, 1932.--Close reoccupation of CIW station B of 1922, east of Calle 26, about 0.50 mile (0.8 kilometer) north of cemeteries, on pasture land of last farm before railroad crossing was reached, going north on Calle 26; 86.0 feet (26.21 meters) southeast of the southeast corner of a concrete well-curbing in the approximate center of the field, 79.0 feet (24.08 meters) from the second fence post east of the well and just south of a broad ditch and marshy area south of the well and line of posts; marked by a stone about 3 by 4 inches (7.5 by 10 centimeters) projecting 1 inch aboveground, a cross marking exact spot. True bearings: near gable of railroad shed, 0.50 mile (0.8 kilometer), 40° 38'.8; tip of Monserrate Church on summit of mountain, 4 miles (6.5 kilometers) distant, 313° 47'.2; left edge of concrete well-curbing near small hut, about 150 yards (137 meters), 321° 21'.6.

Buenaventura, El Valle del Cauca, 1932.--Proximate reoccupation of CIW station of 1923, about 0.33 mile (0.5 kilometer) northwest of former location, on reclaimed land north of Hotel Estación; about 85 yards (78 meters) from the end of the railroad tracks and directly opposite a steel tank on the roof of the freight shed, 104.0 feet (31.68 meters) north of a line of fence posts running east and west and in line with a line of fence posts running about east-northeast and 125.5 feet (38.25 meters) from the near end of this line; marked by a stone about 3 by 7 by 14 inches (7.5 by 18 by 36 centimeters) projecting about 1.5 inch (4.0 centimeters) aboveground, lettered "CI," a cross between the letters marking the exact spot. True bearing: left edge of shed about 0.25 mile (0.4 kilometer), 266° 10'.0.

Cali, El Valle del Cauca, 1932.--Practical reoccupation of CIW station of 1923, across the road and south of the old unused brewery, on a slight hillock, 86.0 feet (26.21 meters) from northwest corner of stone culvert under road, 5 feet (1.5 meter) from edge of bluff; marked by a rough triangular stone about 3 by 7 by 7 inches (7.5 by 18 by 18 centimeters) projecting 1 inch (2.5 centimeters) aboveground, a cross indicating the exact spot. True bearings: left edge of white house, about 200 yards (183 meters) distant, 34° 53'.6; left edge of left porch post of house about 150 yards (137 meters), 232° 33'.4; weather vane on dome of cathedral, 301° 33'.8.

Puerto Berrio, Antioquia, 1932.--Close reoccupation of CIW station of 1922, south of hotel on flat top of small hill about 100 feet (30 meters) high, occupied by houses of employees of railroad, 18 paces (15 meters) north of the south edge of the hill, 13 paces (11 meters) from the northeasterly edge of the hill and 51.0 feet (15.5 meters) from the corner of a barbed-wire fence. The station on the main hill was about in line with the center of a tongue of high land running toward the southeast. Marked by a cross cut in a naturally embedded stone about 3 by 10 inches (7.5 by 25 centimeters) projecting about 3 inches (7.5 centimeters) aboveground. True bearings: near gable of large red-roofed house across the river, about 2 miles (3 kilometers) distant, 172° 53'.8; gable of rear house, 100 yards (91 meters) distant, 203° 44'.8; gable of front house, 211° 12'.2.

Puerto Colombia, Bolivar, 1933.--On flat open ground northwest of end of railroad track, on slight elevation, about 100 yards (91 meters) northwest of railroad shed; 44.5 feet (13.56 meters) southeast of picket fence, 103.3 feet (31.48 meters) northeast of house containing small shop; marked by concrete post about 3 by 3 by 16 inches (7.5 by 7.5 by 40 centimeters) projecting about 1 inch (2.5 centimeters) aboveground, a cross marking exact spot. True bearings: left gable of roof of house on a hill about 1 mile (1.6 kilometer) distant, 319° 42'.0; near corner of last house on the street, 338° 24'.0.

Ecuador

Guayaquil, Guayas, 1932.--Exact reoccupation of CIW station of 1924 and 1926, located on a farm called "Hacienda Atarazana," adjacent to insane asylum, 0.50 mile (0.8 kilometer) north of city reservoir on Santa Ana Hill, on level plain and on bank of a broad, shallow ditch; about 75 feet (23 meters) east of a road, 0.25 mile (0.4 kilometer) west of river, 215 yards (187 meters) east of a tree at the edge of the broad ditch; marked by concrete monument 39 inches (1 meter) long, 10 inches (25 centimeters) square, projecting about 3 inches (8 centimeters) aboveground, lettered "CIW 1924," a cross marking exact spot. True bearings: right corner of fence in front of asylum, 6° 45'.0; left corner of large frame house on the plain, 156° 02'.4; base of tall mast on Santa Ana Hill, 329° 56'.4; base of second mast on Santa Ana Hill, 330° 06'.6; left edge of ventilator of house on reservoir, 339° 27'.4.

Quito, Pichincha, 1932.--Three stations were occupied. Station A was a close reoccupation of CIW stations of 1908, 1916, 1924, and 1926, on hill called Ichimbia, east of the city, about 600 yards (550 meters) northeast along top of hill by road from large house of Antonio Herrera, in last field on right before turn of the road, at highest point of road, almost opposite remains of old house built into adobe wall on other side of road, at gap in row of eucalyptus trees along east side of road; 25.4 feet (7.74 meters) from adobe and cactus wall, 36.1 feet (11.00 meters) from nearest tree to northwest, 85.6 feet (26.09 meters) from nearest tree to southwest; marked by granite stone about 3 by 8 inches (7.5 by 20 centimeters) projecting about 1 inch (2.5 centimeters) aboveground, lettered "CI," a cross between the letters marking exact spot. True bearings: most prominent transmission-line tower, about 2 miles (3 kilometers) distant, 0° 25'.0; geodetic pyramid on Mt. Pavecillo, 64° 15'.8; monument on hillside, 91° 48'.2; near gable of house on hill, about 3 miles (5 kilometers) distant, 219° 19'.8.

Station B was an exact reoccupation of CIW station of 1924 and 1926, on grounds of the "Escuela de Artes y

SOUTH AMERICA

Ecuador--concluded

Oficios," north of carpenter shop near edge of deep ravine, 5 paces (4 meters) southwest of adobe wall along edge of ravine, 3.5 paces (3 meters) south of a tree to which wire fence was attached; marked by concrete post 10 inches (25 centimeters) square, 30 inches (76 centimeters) long, projecting 2 inches (5 centimeters) aboveground, lettered "CIW 1924," a cross marking exact spot. True bearings: northwest corner of carpenter shop, 21° 09'.0; right edge of house on hill, east of prison, 233° 26'.0.

Station C was located south of the city on hill called "Panecillo," site of main battlefield during revolution of August, 1932; 142.3 feet (43.37 meters) west of west corner of a pyramidal monument of a base line established by the French Geodetic Expedition of 1910, 60.9 feet (18.56 meters) northeast of lone tree in southwest section of hilltop, 44.0 feet (13.4 meters) north-northeast of center of road; marked by cement block 8 by 8 inches (20 by 20 centimeters), 12 by 12 inches (30 by 30 centimeters) at bottom, 16 inches (41 centimeters) long, projecting about 1 inch (2.5 centimeters) aboveground, a cross marking exact spot. True bearings: left corner of distant house, about 2 miles (3 kilometers), 30° 24'.0; upper right corner of Miraflores bench mark (small, white, truncated pyramid), about 1 mile (1.6 kilometer), 181° 40'.8; tip of San Agustin Church, 224° 56'.4; upper right corner of Monjas bench mark, 1.5 mile (2.4 kilometers) distant, 260° 14'.6.

Guiana

Bartica, British Guiana, 1931.--Close reoccupation of CIW stations of 1908 and 1923, probably about 18 feet (5 meters) west of the 1908 station, and about 80 feet (25 meters) west-by-south of probable location of the 1923 station, just across road north of hospital grounds, 92 feet (28.1 meters) from large mango tree to west-northwest, 27 feet (8.2 meters) from middle of road, 38.3 feet (11.68 meters) from edge of stone wall at the riverbank, and 72.8 feet (22.20 meters) from fence corner of hospital grounds; marked by cross cut in large stone set flush with ground. True bearings: north gable of west wing of hospital, 34° 59'.6; east gable of cottage, 110° 17'.8; bisection of very small island 3 miles (5 kilometers) down river, 192° 33'.0; south end of roof of house across river, 263° 22'.2.

Cayenne, French Guiana, 1931.-- Two stations were occupied. Station A was exact reoccupation of CIW station A of 1908, 1918, and 1923, in public roadway south of Botanical Gardens in eastern part of town, 775 feet (236 meters) south of the south garden gate, 10 feet (3 meters) east and 31.5 feet (9.61 meters) west of edges of ditches beside roadway, nearly in line between two meridian monuments, 42 by 42 centimeters square and 45 centimeters high, 29.58 meters and 26.18 meters from the north and south monuments, respectively; marked by copper rod 1.5 centimeter in diameter, projecting 1 centimeter from center of concrete post 12 centimeters square which projects about 2 centimeters above a concrete slab 1.54 meters square. True bearings: west side of west gatepost at south entrance to gardens, 166° 08'.3; east side of east gatepost at south entrance to gardens, 167° 06'.1.

Station C was 98.0 feet (29.89 meters) north-by-east from A across ditch along road and 20.8 feet (6.34 meters) east of north monument of meridian line; not marked. True bearing: south monument of meridian line, 6° 08'.0.

Georgetown, British Guiana, 1931.--Two stations were occupied. Station A was exact reoccupation of CIW station A of 1923, on ground south of and belonging to the Botanical Gardens (leased to a racing association and still called "D'Urban Racecourse"), a little south of center of racecourse, 175 feet (53.4 meters) from edge of drainage canal along south side of grounds, 38 feet (11.6 meters) west of drainage canal to east, and 67.6 feet (20.62 meters) from a wire fence beyond this canal; marked by a concrete block 6 by 6 by 24 inches (15 by 15 by 61 centimeters) projecting slightly aboveground and lettered "CIW 1918." True bearings: tip of ventilator at Queen's College, 104° 20'.2; vertical anemometer standard of Botanical Gardens office building, 128° 50'.8; center of weather vane on office building, 128° 58'.0.

Station B was exact reoccupation of CIW station B of 1923, about 850 feet (250 meters) north-by-west of A, east of superintendent's house, near eastern end of small enclosed lot used as pasture, 32.5 feet (9.91 meters) from hedge to north, 56.8 feet (17.32 meters) from hedge to east, and 81.4 feet (24.83 meters) southeast of small gate leading to driveway; marked by cross in top of hexagonal granite post (easily seen from gate) about 8 inches (20 centimeters) in diameter and 3.5 feet (1.1 meter) long, projecting about 7 inches (18 centimeters) aboveground and lettered "CI." True bearings: tip of ventilator at west end of smaller Queen's College building, 83° 44'.8; supporting staff of ball having radial spikes, at Botanical Gardens office, 105° 50'.6; weather vane support, 105° 55'.4.

Paramaribo, Dutch Guiana, 1931.-- Probably close reoccupation, within 10 feet (3 meters), of CIW station C of 1923, exact relocation of site impossible owing to recent extensive grading, leveling, tree-planting, etc., for conversion into a small park. New station located in southeastern part of this park, 60.4 feet (18.42 meters) from inner edge of the low sea wall, 78.5 feet (23.94 meters) from most easterly lamppost along south side of grounds, 70.3 feet (21.44 meters) from bottom northeast corner of steps leading down from low embankment back of sea wall; marked by cross cut in large stone set almost flush with ground. True bearings: east gable of Public Works Building, 69° 52'.6; tip of tower on Finance Building, 74° 07'.5; left-hand spire of Catholic Church, 89° 07'.6; right-hand spire of Catholic Church, 89° 32'.8.

Peru

Arequipa, Arequipa, 1932.-- Two stations, B and C, were occupied. B was exact reoccupation of CIW station B of 1923, 1924, and 1926, on grounds of former Arequipa branch of Harvard Astronomical Observatory (now the property of Senor Gibson of Arequipa who has remodeled and improved it for a country home), in northeast corner of grounds, 4.1 meters from north adobe wall surrounding garden, and 4.75 meters from east wall; marked by deep cross cut in upper face of a large block of "tufa" rock buried 16 inches (41 centimeters) below ground. True bearings (1926 values): spire of church across valley, 333° 01'.7; ball on tower of house in valley, 336° 35'.5; spire of church in Carmen Alto, 358° 32'.6.

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Peru--continued

Station C was practical reoccupation of CIW station C of 1926, about 1.5 mile (2.5 kilometers) south-by-east from B, on grounds of Arequipa Golf Club, northeast of clubhouse, almost in line between clubhouse and El Misti, at intersection of two lines, the first passing through a conical tower on large house in Arequipa and the power and light post nearest clubhouse, and the second bisecting the space between twin towers of Cayima Church, and passing through the second power and light post from clubhouse, station being 109.0 meters from this second post; marked by cross cut in top of large boulder projecting slightly aboveground. True bearings: tip of dome on Santa Teresa Convent, 0° 13′.8; right-hand spire of cathedral at Plaza Central, 20° 48′.5; church spire at Reccoletta Convent, 46° 49′.5; left-hand spire of Cayima Church, 102° 31′.0; church spire in Carment Alto, 153° 54′.7; tip of dome on San Antonio Church, 333° 26′.0.

Barranca, Loreto, 1932.-- Two stations were occupied. Station A was a close reoccupation of CIW station of 1911, on land now designated as "La Hacienda," about halfway between the garrison and the village; 74.6 feet (22.74 meters) west of wire fence bounding east side of property, 27.0 feet (8.2 meters) north from edge of bluff, 105 feet (32.0 meters) south of southwest corner of a farmhouse; marked by stone about 4 by 6 inches (10 by 15 centimeters) at top, projecting about 1 inch (2.5 centimeters) aboveground, lettered "CI," a cross between the letters marking exact spot. True bearing: tree on opposite bank of river, 37° 37′.2.

Station B was located on the parade ground of the military garrison, about 0.50 mile (0.8 kilometer) east of A and about 1 mile (1.6 kilometer) east of the village of Barranca; 81.2 feet (24.75 meters) north of a palisade fence at edge of bluff, 82.5 feet (25.06 meters) south of southeast corner of most westerly shed to north, 79.3 feet (24.17 meters) east of northeast corner of soldiers' barracks, 88.0 feet (26.82 meters) from northwest corner of officers' quarters; marked by a stone about 3 by 7 inches (7.5 by 18 centimeters), projecting slightly aboveground, lettered "CI," a cross between the letters indicating the exact spot. True bearing: fork in tree on opposite bank of river, 30° 55′.4.

Cajamarca, Cajamarca, 1932.--Two stations were occupied. Station A was on a farm belonging to Hilbek Kuntje and Company, about 0.25 mile (0.4 kilometer) east of the town, on the right side of the road which was an extension of Calle Arequipa, at the first small curve in the road after leaving the town; in most northeasterly of four open pasture lots completely surrounded by tall eucalyptus trees. It was 182 feet (55.47 meters) southeast of a row of trees bordering the northwest side of the lot, 133 feet (50.54 meters) northeast of the row of trees bordering the southwest side of the lot; marked by a stone about 4 by 4 inches (10 by 10 centimeters) projecting about 1.5 inch (4 centimeters) aboveground, lettered "CI," and having a cross between the letters marking the exact spot. True bearings: lone tree on mountain, about 3 miles (5 kilometers), 170° 30′.7; small but prominent peak on mountain, 203° 36′.7; fork in tree near small house, 200 yards (183 meters), 334° 35′.7.

Station B was near the center of the second plot southwest of the plot in which A was located, 117 feet (35.66 meters) southwest of the row of trees bordering the northeast side of this lot, 174 feet (53.04 meters) southeast of the row of trees bordering the northwest side of the lot; marked by stone about 4 by 6 inches (10 by 15 centimeters) projecting 1 inch aboveground, lettered "CI," a cross between the letters marking exact spot. True bearings: left end of small black hump on mountain about 4 miles (6.5 kilometers) distant, 68° 04′.7; left edge of board nailed on tree about 150 yards (137 meters) distant, 195° 40′.9.

Chachapoyas, Amazonas, 1932.--In broken ground directly north of the town, west of wooded patch on hillside, about 100 yards (91 meters) south of large open and level spot plainly visible from main playa; reached by path that was a southward extension of Calle Bongara, on first level spot, about 40 feet (12 meters) in diameter, reached by the path after passing through a gate in a cactus hedge; 25 paces (20 meters) east of the path, 43 paces (35 meters) east of the top of the larger of two small hillocks just west of the path, 102 feet (31.1 meters) north of the cactus hedge; marked by stone about 3 by 7 inches (7.5 by 18 centimeters) projecting about 1 inch (2.5 centimeters) aboveground, lettered "CI," a cross between the letters marking exact spot. True bearings: lower east corner of house about 500 yards (457 meters) distant, 13° 49′.6; tip of Burgos Church, 315° 47′.6; tip of San Lazaro Church, 333° 44′.3; east tower of cathedral, 356° 22′.0.

Chilete, Cajamarca, 1932.-- Practical reoccupation of CIW station of 1912, in bare rocky field about 0.1 mile (200 meters) west of railway station, 5 paces (4 meters) southeast of top of bank overlooking lower highly cultivated valley land; 46.2 feet (14.08 meters) west of ruins of old brick limekiln, 60.5 feet (18.44 meters) southwest of ruins of old stone and wire fence; marked by stone, roughly triangular, 4 by 6 by 6 inches (10 by 15 by 15 centimeters) projecting 1 inch (2.5 centimeters) aboveground, lettered "CI," a cross between the letters marking the exact spot. True bearings: upper left corner of tin roof of lean-to across the river, 85° 33′.8; southwest gable of railway station, 277° 48′.6.

Huancayo Observatory, 1927-1944.--Observations were made weekly in the absolute building on pier E_m with magnetometer No. 10 and on pier W_m with inductor No. 5, for control of the Eschenhagen magnetograph, in the years 1927 to 1944. Intercomparisons of the observatory instruments with field instruments were made in the years 1929, 1932, and 1936. True bearings: from pier E_m the mark on the regular azimuth pillar bears 7° 14′.3, and from pier W_m the same mark bears 6° 31′.5.

Iquitos, Loreto, 1932.-- Two stations were occupied. Station A was a very close reoccupation of CIW station A of 1924, near southwest corner of Playa 28 de Julio, 119.2 feet (36.34 meters) north of most westerly door of most westerly brick house on south side of square, 92.6 feet (28.77 meters) south of a lamppost, 60 paces (50 meters) northwest of a concrete refreshment booth; marked by concrete block 8 by 8 inches (20 by 20 centimeters) projecting about 1.5 inches (4 centimeters) aboveground, lettered "CIW 1932," a drill hole in center marking exact spot. True bearings: west gable of tin-roofed house, about 600 yards (550 meters), 183° 48′.5; east gable of most westerly house on north side of playa, 208° 42′.5; cross on church near main playa in

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Peru--continued

Iquitos, 0.75 mile (1.2 kilometer), 228° 16'.3; ball on monument in northeast corner of playa, 264° 24'.7.

Station B was a close reoccupation of CIW station B of 1924, 196.9 feet (60.19 meters) east of A and almost in line between A and monument in northeast corner of playa; marked by drill hole in top of concrete block 8 by 8 inches (20 by 20 centimeters) projecting about 1.5 inch (4 centimeters) aboveground, lettered "CIW 1932 LMS," this station marker also marking the south end of a meridian line established for the Iquitos municipal government. The north marker of the meridian line was distant 134.4 feet (40.96 meters), consisting of a similar concrete block, lettered "LMN, IQUITOS, 1932, CIW." True bearings: east gable of most westerly house on north side of playa, 173° 09'.8; ball on monument in northeast corner of playa, 264° 02'.2; top of prominent chimney about 0.50 mile (0.8 kilometer) distant, 338° 46'.0.

Juliaca, Puno, 1932.--Two stations were occupied. Station A was exact reoccupation of CIW station A of 1923, 1924, and 1926, on pampa 0.50 mile (0.8 kilometer) southwest of the public square, 66 paces (about 60 meters) east of road leading from town, 42.0 feet (12.81 meters) north of northwest corner of building in ruins, and in line with west side of same building; marked by cross in a rough native stone projecting about 2 inches (5 centimeters) aboveground. True bearings: left-hand second-story veranda post on large store building, 0.75 mile (1.2 kilometer), 201° 21'.8; cross on La Merced Church, 223° 19'.2; left-hand second-story veranda post on dwelling, 0.33 mile (0.5 kilometer), 273° 02'.6.

Station B was exact reoccupation of CIW station B of 1926, 265 feet (80.8 meters) southwest of A and in line with A and cross on La Merced Church; marked by cross cut in rough stone projecting about 2.5 inches (6 centimeters) aboveground. True bearings: left-hand second-story veranda post of large store building, 203° 35'.5; cross on La Merced Church, 223° 18'.8; spike at south end of roof of large building, 244° 16'.8.

Las Palmas, Lima, 1929.-- Two stations, A and B, were established in the northeast corner of the Las Palmas Aviation Field. The line joining the stations was parallel with, and 18 paces from, a low adobe wall and hedge forming the eastern boundary of the aviation field. Station A was located 132 paces, and B 100 paces, from the near side of a road forming the northern boundary of the flying field. A was marked by a brass-bound peg left 1 inch aboveground. B was unmarked. True bearings: (from A) cross on hill to southwest, about 4 miles (6 kilometers), 49° 59'.3; cross on spire of reformatory, 56° 08'.1; trigonometric survey mark on near hill, about 1 mile (1.6 kilometer), 147° 37'.5; trigonometric survey mark on hill to southeast, about 5 miles (8 kilometers), 319° 40'.3.

Mollendo, Arequipa, 1933.--Close reoccupation of CIW station B of 1924, south of cemetery, in line with west wall of cemetery, and 130.0 feet (39.65 meters) south of southwest corner of cemetery, and 198.0 feet (60.39 meters) west of northwest corner of a stone-walled enclosure; marked by a concrete post buried under a large stone covered with soil. True bearings: cross on hill, 0.50 mile (0.8 kilometer), 155° 48'.8; cross on hill, 4 miles (6 kilometers), 224° 55'.4; southeast corner of cemetery, 282° 44'.8; bottom of flagpole, 500 yards (450 meters), 339° 18'.0.

Moyobamba, San Martin, 1932.-- Three stations were occupied. Station A was about 3 miles (5 kilometers) south of the town near public hot spring baths, property of Admiral Gennaro Como, also known as Sibi Satis; in pasture lot behind main dwelling house on the property, 30 paces (25 meters) east of top edge of gully along west side of lot, 42.5 feet (12.95 meters) from corner of log fence enclosing field planted to coffee and pineapples; marked by stone about 4 by 6 inches (10 by 15 centimeters) lettered "CI," a cross between the letters marking the exact spot. True bearings: left edge of tree trunk visible through aperture formed by two crooked converging tree trunks, about 200 yards (183 meters) to eastward, 248° 25'.2.

Station B was on the same property as A, distant 535 feet (163 meters) horizontally and 103 feet (30.6 meters) vertically from A, in a direction a little east of south and up the slope of a steep hill south of the pasture lot, back of the main house, between two gullies, 105 feet (32.0 meters) east of the fence at the edge of the west gully; marked by a rough triangular stone, about 6 by 8 by 8 inches (15 by 20 by 20 centimeters), lettered "CI," a cross between the letters marking the exact spot. True bearings: indentation in top of clump of trees on distant hilltop, about 5 miles (8 kilometers), 136° 27'.5; station A, 149° 10'.3.

Station C was distant 225 feet (68.6 meters) horizontally and 33.5 feet (10.21 meters) vertically from B, almost in the line from A to B extended; on a knoll or shoulder of the hill above B, 19 paces (16 meters) west of top of edge of gully toward the east, 86.5 feet (26.37 meters) east of fence along gully toward the west; marked by stone about 4 by 10 inches (10 by 25 centimeters) projecting about 1 inch (2.5 centimeters) aboveground, lettered "CI," a cross between the letters marking exact spot. True bearing: dent in top of clump of trees on distant hilltop, about 5 miles (8 kilometers), 136° 34'.9.

Nauta, Loreto, 1932.-- Proximate reoccupation of CIW station of 1910, on property of San Ignacio on the high left bank of the Maranon (Upper Amazon) River, at the mouth of the stream called "Rio Nauta," on ledge at foot of high hills behind property, 64.1 feet (19.54 meters) northeast of inner edge of water reservoir for new power plant, 52.0 feet (15.85 meters) and 57.0 feet (17.37 meters), respectively, from two trees on the ledge; marked by brick and cement pyramid, 4 by 6 inches (10 by 15 centimeters) at top, 10 by 16 inches (25 by 40 centimeters) at bottom, 18 inches (46 centimeters) deep, and projecting 1 inch (2.5 centimeters) aboveground; lettered "CIW 1932," a drill hole marking exact spot. True bearings: east corner of valve house of hydroelectric plant, 36° 21'.2; west gable of main living quarters, 284° 55'.3.

Paita, Piura, 1932.--Exact reoccupation of CIW station of 1912 and 1924, on bluff east of the town on town side of cemetery on bank of deep gully, 486 feet (148.1 meters) southwest of northwest corner of cemetery and 2.7 feet (0.82 meter) northwest of the line of the northwest wall of cemetery extended; marked by a cross cut in a boulder 7 inches (18 centimeters) in diameter and projecting 3 inches (7.5 centimeters) aboveground. True bearings: base of cross on plain, 10° 06'.4; north side of concrete tank about 150 yards (137 meters) distant, 49° 16'.6; base of flagpole on customs house, 105° 18'.2; cross over gate of cemetery, 269° 00'.6.

Pacasmayo, Libertad, 1932.-- Two stations were occupied. Station A was a close reoccupation of CIW

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station of 1912, on high bluff north of town, east of Catholic cemetery, 79.9 feet (24.35 meters) from east fence of cemetery, 136.8 feet (41.70 meters) and 117.0 feet (35.66 meters), respectively, from the northern and southern extremities of the east line fence of cemetery, 15 paces (12 meters) from the top edge of bluff east of the station; marked by rough triangular stone, 6 by 6 by 6 inches (15 by 15 by 15 centimeters) set almost flush with ground, lettered “CI,” a cross between the letters marking exact spot. True bearings: base of flagpole on railway station, 39° 06′.4; cross over gate of Chinese cemetery, 198° 15′.0; station B, 295° 45′.2.

Station B was east and a little south from A, 64 paces (55 meters) southeast from foot of high bluff, 440 feet (134 meters) from A horizontally, and 58 feet (18 meters) vertically, on lower ground, 121 paces (100 meters) southeast from center of small trail leading in northeasterly direction from the town; marked by rough stone about 8 inches (20 centimeters) in diameter, projecting about 1 inch (2.5 centimeters) aboveground, lettered “CI,” a cross between the letters marking exact spot. True bearings: southeast corner of railway station, 55° 57′.4; cross on church, 58° 20′.8; base of flagpole on railway station, 59° 30′.5.

Piura, Piura, 1932.--Two stations were occupied. Station A was a close reoccupation of CIW stations of 1912 and 1924, on mud flat on east bank of Piura River, about 0.25 mile (0.4 kilometer) north of steel bridge, opposite most northerly two-story house on west bank of river; station was not marked. True bearing: west edge of most westerly steel pier of bridge, 16° 18′.2.

Station B was a close reoccupation of CIW station B of 1924, about 0.75 mile (1.2 kilometer) northwest of A, 59.8 feet (18.23 meters) west-northwest of the 1924 station, 212.6 feet (64.82 meters) south of the fence along south line of radio station reserve, 46.2 feet (14.08 meters) east-northeast of concrete wall; marked by concrete block about 8 by 8 inches (20 by 20 centimeters) at top, larger below, projecting 1.5 inch (4 centimeters) aboveground, lettered “CIW 1932,” a drill hole in center marking exact spot. True bearings: far corner of corrugated iron fence, about 150 yards (137 meters) distant, 15° 47′.8; north ventilator on Marconi office, 241° 39′.7; south ventilator on same building, 244° 18′.8; head of near figure of an angel on church, 274° 55′.5; head of farther figure, 275° 08′.0.

Tres Unidos, Loreto, 1932.--Two stations were occupied. Station A was a proximate reoccupation of CIW station of 1911, on tongue of land between the Marañon River (Upper Amazon) and the Huallaga River at landing and fuel station for steamers; 117.4 feet (35.78 meters) north of most northerly shed on the grounds, 6 paces (5 meters) from top edge of bank of Huallaga River; marked by rough triangular stone, about 3 by 4 by 4 inches (7.5 by 10 by 10 centimeters) at top, larger at bottom, projecting about 1 inch (2.5 centimeters) aboveground, lettered “CI,” a cross between the letters marking exact spot. True bearing: notch in buttress root of large tree about 300 yards (274 meters) distant, 169° 39′.8.

Station B was about 150 yards (137 meters) south of A, 31 paces (25 meters) east of top of bank of Marañon River, 129.6 feet (39.50 meters) south of large tree near landing stage, in line with north end of main living quarters, 155.0 feet (46.24 meters) from northwest corner of the quarters; marked by stone about 3 by 4 inches (7.5 by 10 centimeters) projecting about 1 inch (2.5 centimeters) aboveground, lettered “CI,” a cross between the letters marking exact spot. True bearing: tree on opposite bank of river, 12° 50′.8.

Yurimaguas, Loreto, 1932.--Two stations were occupied. Station A was a proximate reoccupation of CIW station of 1911, in the southeastern section of the main playa of Yurimaguas; 27.0 feet (8.23 meters), 40.5 feet (12.34 meters), 36.0 feet (10.97 meters), and 67.4 feet (20.54 meters), respectively, from the near edge of sidewalks to the south, east, north, and west; marked by a stone about 4 by 5 inches (10 by 13 centimeters) projecting 1 inch (2.5 centimeters) aboveground, lettered “CI,” a cross between the letters marking the exact spot. True bearing: cross on church facing the playa, 104° 09′.2; left edge of door frame of house on street just east of the station, 186° 03′.8.

Station B was about 200 yards (183 meters) southwest of A, in open field southwest of municipal market, 144 feet (43.89 meters) from southwest corner of fenced enclosure behind the market, 68.6 feet (20.91 meters) from a fence at the southeast side of the field; marked by a rough triangular stone, about 6 by 6 by 5 inches (15 by 15 by 12 centimeters) projecting 1.5 inch (4 centimeters) aboveground, lettered “CI,” a cross between the letters marking exact spot. True bearings: nearest corner of white house to north, 195° 51′.4; cross on church facing the playa, 222° 42′.6.

Uruguay

Colon, Colegio Pio, Montevideo, 1932.--Two stations were occupied. Station A was close reoccupation of CIW station A of 1925, probably about 8 meters northwest of 1925 station, on grounds of Colegio Pio, in a cultivated field, 54.8 meters south of middle of doorway of astronomical observatory, 29.7 meters southeast of northeast corner of small brick tool house, and 52.3 meters northwest of the foot of a telephone pole standing 7 meters from a wire fence; not marked. True bearings: spire on college chapel, 222° 49′.8; staff on tower of meteorological observatory, 228° 05′.7; standard at north end of roof of nearby house, 244° 34′.1; standard at south end of roof of nearby house, 249° 42′.6.

Station B was close reoccupation of CIW station B of 1925, 78.2 meters northwest of A, in middle of path between cultivated plots of ground, and 46.3 meters northwest of northwest corner of small brick tool house; marked by cross cut in flat stone about 10 inches (25 centimeters) square and 4 inches (10 centimeters) thick, buried about 2 inches (5 centimeters) underground. True bearings: spire on college chapel, 233° 46′.8; small anemometer standard on tower of meteorological observatory, 239° 00′.8; larger anemometer standard, 239° 10′.8; base of shorter of two staffs on tower of meteorological observatory, 240° 07′.4; base of taller of two staffs, 240° 21′.8.

Venezuela

Caracas, Federal District, 1931.--Two stations were occupied. Station A was exact reoccupation of CIW

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station of 1905, 1912, 1914, and 1922, on grounds of National Astronomical Observatory, 63.2 feet (19.26 meters) north east of northeast corner of observatory building, 33.6 feet (10.24 meters) northeast-by-east of a round instrument pier, 43 feet (13.1 meters) east of center of large boulder, and 49 feet (14.9 meters) southeast of center of large rectangular pier; marked by small hole in top of marble post 3.5 by 6 by 27 inches (9 by 15 by 69 centimeters) projecting 2 inches (5 centimeters) aboveground and lettered "CI 1905." True bearings: apex of gateway to large enclosure, 175° 02′.8; east spire of Pantheon Nacional, 240° 14′.8; clock tower facing Bolivar Square, 259° 48′.3; south spire of church in eastern edge of city, 268° 42′.5.

Station B was exact reoccupation of CIW station of 1922, on observatory grounds about 300 feet (91 meters) southwest of A, on low hilltop, 193.0 feet (58.83 meters) southwest of southwest corner of observatory, 54.0 feet (16.46 meters) southeast of telephone pole, 32 feet (9.8 meters) from edge of road embankment to north, and 20 feet (6.1 meters) from edge of road embankment to south; marked by rough stone about 4 by 8 by 24 inches (10 by 20 by 61 centimeters) projecting about 2 inches (5 centimeters) above surface. True bearings: tip of transmitting line tower, 132° 04′.2; spire of small church, 138° 10′.2; apex of gateway to large enclosure, 177° 12′.4; spire of church just south of capitol building, 264° 32′.0; north spire of large church in eastern part of city, 267° 31′.8.

Ciudad Bolivar, Bolivar, 1931.--Two stations were occupied. Station A was an exact reoccupation of CIW station of 1913 and 1923, on north side of Orinoco River almost directly across from center of city, in state of Bermudez, near second group of large boulders below village of Soledad; 40 feet (12.2 meters) north of deep cross cut in top of large boulder about 12 feet (3.6 meters) long, extending about 4 feet (1.2 meter) aboveground and of lighter color than others of the group, the cross being in range between the station and spire of Catholic Church; about 75 yards (68 meters) east of the only stone house in the vicinity; marked by cross in granite stone 3 by 8 by 26 inches (7.5 by 20 by 66 centimeters) projecting 1 inch (2.5 centimeters) aboveground and lettered "CI." True bearings: northwest corner of gray shed, 8° 05′.9; tip of telegraph tower across river, 11° 22′.6; tip of telegraph tower on island in river, 42° 36′.1.

Station B was an exact reoccupation of station B of 1923, 75 feet (22.8 meters) west of A, about 50 yards (46 meters) east of only stone house in the vicinity; marked by granite stone about 8 by 10 inches (20 by 25 centimeters) at top, projecting about 2 inches (5 centimeters) aboveground, lettered "CI 1923," a cross marking exact spot. True bearings: northeast corner of gray shed across river, 6° 43′.4; station A, 274° 53′.7; cross on tower of Catholic Church, 354° 22′.8.

Comunidad, Amazonas, 1932.--Close reoccupation of CIW station of 1913; in line with the north side of and 189.9 feet (57.88 meters) west of the northwest corner of the church, 50.1 feet (15.27 meters) from a cross cut in the eastern extension of the large landing rock, 68.2 feet (20.73 meters) from a cross cut in a smaller adjoining rock, and 18.5 feet (5.64 meters) from northwest corner of a wooden drying rock; marked by irregular stone projecting about 2 inches (5 centimeters) aboveground, the projecting portion being about 1.5 by 8 inches (4 by 20 centimeters), a cross cut in top marking exact spot. True bearings: tree on opposite bank of river, 109° 52′.8.

Isla Pajaro, Zulia, 1931.--Close reoccupation of CIW station of 1922, about 5.5 miles (9 kilometers) southeast of Maracaibo on a small uninhabited island about 165 yards (150 meters) long and 27 yards (25 meters) wide rising 3 or 4 yards or meters above water level in Lake Maracaibo. It was also about 0.6 mile (1 kilometer) southeast of Isla Providencia on which a leper colony was isolated. Station was situated 228.6 feet (69.68 meters) from southern end of island, 72.5 feet (22.1 meters) northwest of concrete filled 4 inch (10 centimeter) iron pipe set in ground, 16 feet (4.9 meters) from western side of island; marked by irregular piece of tile about 2 by 4 by 16 inches (5 by 10 by 40 centimeters), the center of small projecting knob on top marking exact spot. True bearings: north radio tower in Maracaibo, 120° 30′.8; tip of clock tower on church in Maracaibo, 124° 40′.3; tip of tower at leper colony on Isla Providencia, 159° 15′.4; gable of house on eastern shore of lake, 344° 11′.2.

La Urbana, Bolivar, 1931.--Two stations were occupied. Station A was exact reoccupation of CIW station of 1914, on south bank of Orinoco River between the town and the river, 141.0 feet (42.98 meters) from the northwest corner of the sixth house from the east end of the street, 153.4 feet (46.75 meters) from the northeast corner of the next house west, 127.5 feet (38.86 meters) from large double tree to southeast, and 36.1 feet (11.00 meters) from a second tree also to southeast. Marked by a granite stone 3 by 8 by 32 inches (7.5 by 20 by 80 centimeters) set so that it projects about 2 inches (5 centimeters) aboveground and inscribed "CI," a cross between the letters marking the exact spot. True bearings: northwest corner of sixth house from east end of street, 5° 40′.4; highest peak in range of hills to east, 257° 00′.0; cross marked on northwest corner of third house from east end of street, 291° 37′.0.

Station B was about 200 yards (183 meters) southeast of A in the line of the east side of the main north and south street of the town extended southward; 145.1 feet (44.22 meters) south from the southwest corner of the last house on east side of street, 243.0 feet (74.06 meters) from center of east face of large boulder at foot of hill to southwest, and 110.7 feet (33.74 meters) from a tree to westward. Marked by granite stone 5 by 10 by 24 inches (12.5 by 25 by 60 centimeters) projecting 2 inches (5 centimeters) aboveground, lettered "CI," a cross between the letters marking exact spot. True bearings: trunk of white tree on north bank of river, 191° 21′.2; gable of house to eastward, 252° 06′.1; center of large prominent boulder on hilltop, 336° 58′.1.

Maracaibo, Zulia, 1931.--Close reoccupation of CIW stations of 1912 and 1922, on country club grounds northwest of the city; in the "rough" behind No. 3 tee, 81.0 feet (24.7 meters) east of eastern edge of third tee, 99.6 feet (30.36 meters) southwest of barbed-wire fence marking edge of country club property, 265 yards (242 meters) north of northeast corner of clubhouse veranda and in line with east edge of veranda, 322 yards (294 meters) north of Las Delicias Street carline; marked by an irregular roofing

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tile about 2 by 8 by 16 inches (5 by 20 by 40 centimeters) set to project 2 inches (5 centimeters) aboveground, a cross on top marking exact spot. True bearings: south gable of house in direction of race track, 104°57'.7; tip of radio tower beyond cemetery, 237° 06'.4; south gable of house near radio tower, 243° 52'.3.

Maroa, Amazonas, 1932.--In the plaza of the town, in line with the south end of and 78.5 feet (23.92 meters) east of the southeast corner of the guesthouse, 74.8 feet (25.0 meters) north of a row of houses south of the plaza, 68.4 feet (20.85 meters) southwest of southwest corner of stone monument in center of plaza; marked by an irregular stone projecting about 2 inches (5 centimeters) aboveground, a cross marking exact spot. True bearing: west side of door of house beyond southeast corner of plaza, 318° 51'.7.

Puerto Ayacucho, Amazonas, 1931.--Two stations were occupied. Station A was at the eastern edge of the town 72.3 feet (22.04 meters) south of the center of the road leading to Sanariapo, within a crescent formed by a large patch of bare rock; 31.7 feet (9.66 meters), 38.8 feet (11.83 meters) and 44.1 feet (13.44 meters), respectively, from three trees to southwest, south, and southeast from station; 135.4 feet (41.27 meters) to southeast corner of corral on other side of road, and 348.5 feet (106.22 meters) from northeast corner of Juan Maniglia's store to westward. Marked by stone about 8 by 8 by 20 inches (20 by 20 by 50 centimeters) projecting 2 inches aboveground, lettered "CI," a cross between the letters marking exact spot. True bearings: flagpole back of Juan Maniglia's house, 109° 47'.8; flagpole behind government office, 0.50 mile (0.8 kilometer), 166° 12'.6; fork in lone tree on hill to southeast, 316° 16'.1.

Station B was about 0.50 mile (0.8 kilometer) west and north from A, in line with south side of the Puerto Ayacucho chapel and 202.5 feet (61.74 meters) east of the southeast corner thereof; in line with east side of a house on a hill to north and 185.5 feet (56.54 meters) south from southeast corner, 158.6 feet (48.34 meters) from southeast corner of a house across road north, and 212.0 feet (64.62 meters) from center of culvert under road leading to Governor's house; marked by cross in an irregularly shaped stone projecting 3 inches (7.5 centimeters) aboveground. True bearings: flagpole behind Juan Maniglia's house, 10° 01'.1; southwest corner of house at roadside, 24° 10'.8; gable of house on prominent hilltop, 353° 08'.9.

Puerto Cabello, Carabobo, 1931.--Practical reoccupation of CIW station of 1912 and 1922, on large open plain south of town, about 550 yards (500 meters) northeast of the northeast corner of cemetery, in line with the west fence of the baseball field and 189.9 feet (57.88 meters) north of the northwest corner of field, 146.5 feet (44.65 meters) northwest of the northwest corner of a bamboo-paling fence around a house, and 486 paces (420 meters) southwest at right angle from the road to Valle Seco; marked by cross cut in a stone about 2 by 8 by 16 inches (5 by 20 by 40 centimeters) projecting 2 inches (5 centimeters) aboveground. True bearings: flagpole on fort on hill, 70° 51'.1; west corner of bottom cross brace of west radio tower, 169° 59'.7; front gable of small house at north edge of plain, 170° 32'.9; top of east radio tower, 171° 23'.4; southeast flagpole on largest building of canning factory, 184° 53'.3.

San Carlos, Amazonas, 1932.--Practical reoccupation of CIW station of 1913; near center of plaza, in line with north side of church, and 117.4 feet (35.72 meters) west from the northwest corner of same, 146.6 feet (44.59 meters) from southwest corner of house just north of church, 211.0 feet (64.49 meters) from northeast corner of second house from east on south side of plaza; marked by cross in rounded top of naturally embedded stone about 12 inches (30 centimeters) in diameter and projecting about 2 inches (5 centimeters) above the surface. True bearings: southwest corner of long building extending entirely across north side of plaza, 169° 26'.3; northwest corner of house just north of church, 215° 48'.1; northeast corner of second house from east on south side of plaza, 325° 12'.1.

San Fernando de Apure, Apure, 1931.--Close reoccupation of CIW station of 1914, across the river from the town on location known as Puerto Miranda, 52.7 feet (16.06 meters) south of stockade-like fence of heavy posts and trees, 63.1 feet (19.23 meters) southeast of southwest corner of stockade, 174.8 feet (53.28 meters) from a gasoline pump toward west and north, 201.0 feet (61.26 meters) east of southeast corner of veranda of a house; marked by pillar of brick and concrete about 30 inches (75 centimeters) high, 12 inches (30 centimeters) square at base, and 7 inches (18 centimeters) square at top, inscribed "CIW 1931." True bearings: west corner of large palace-like building facing river, 0° 26'.6; pyramidal tower of church, 24° 17'.4; front gable of house on opposite side of river, 296° 14'.4; north flagpole on large palace-like building facing river, 358° 48'.4.

San Fernando de Atabapo, Amazonas, 1932.--Two stations were occupied, both of which were practical reoccupations of CIW station of 1913. Station A was at the approximate center of the village plaza , 154.5 feet (47.09 meters) from the center of the northeast gate, 148.0 feet (45.15 meters) from the center of the northwest gate, 139.5 feet (42.52 meters) from center of southeast gate, 79.0 feet (24.08 meters) from a large tree near south side of plaza, and 117.8 feet (35.80 meters) from a tree near southwest gate; marked by a stone about 4 by 6 inches (10 by 15 centimeters) projecting about 1.5 inch (4 centimeters) aboveground and lettered "CI," a cross between the letters marking the exact spot. True bearings: cross cut on east wall of Fune's house, near southeast corner, 75° 26'.5; lamppost near northeast corner of plaza, 237° 34'.8; east tower of church, 284° 22'.5.

Station B was about 145 yards (133 meters) east and south from A and about 75 yards (68 meters) north of the site of the 1913 station; in line with south side of street adjoining the plaza on the south, 87.5 feet (26.7 meters) from a post to westward, 51.1 feet (15.6 meters) from large tree toward northeast, 97.2 feet (29.62 meters) from southeast corner of building across street northwest; marked by stone 3 by 8 by 28 inches (7.5 by 20 by 71 centimeters) projecting 2 inches aboveground, lettered "CI," a cross between these letters marking exact spot. True bearings: gable of nearest house to westward, 110° 23'.3; fork in tree on opposite bank of river, 115° 31'.8.

Valera, Trujillo, 1931.--On plain west of the city and just west of Calle Dr. Mendoza, between the terminals of Avenida 5 de Julio and Avenida Andres Bello; 99.4 feet (30.40 meters) west of tree on edge of Calle Dr. Mendoza, 72.6 feet (22.13 meters) northwest of the northwest

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Venezuela--concluded

corner of house, 55 paces (45 meters) south of south edge of baseball field; marked by large stone shaped like an irregular truncated pyramid 16 inches (40 centimeters) long, 6 by 10 inches (15 by 25 centimeters) at base and 2 by 3 inches (5 by 7.5 centimeters) at top set to project 2 inches (5 centimeters) aboveground, a cross marking exact spot. True bearings: large cross on hillside, 78° 54′.9; west spire of cathedral, 182° 38′.7; east spire of cathedral, 184° 00′.5.

Villa de Cura, Aragua, 1931.-- Close reoccupation of CIW station of 1914, in line with south edge of street which going east from station passes along north edge of main playa, 328 yards (300 meters) west of last row of houses four blocks west of playa, about 100 yards (91 meters) north of extension of street along south side of playa, 50.3 feet (15.33 meters) south of stump of large tree, 150.2 feet (45.78 meters) southwest of center of nearest of two concrete culverts under road north of station; marked by irregular stone having a notch cut in protruding edge. True bearings: southerly of twin peaks on range to west, 102° 00′.9; west edge of prominent house, 177° 01′.8; most easterly high peak on range to north, 252° 29′.8; highest peak toward southeast, 316° 38′.0.

Zamuro, Amazonas, 1931.--Exact reoccupation of CIW station of 1913, on east bank of Orinoco River about 2 miles (3 kilometers) upstream from Puerto Ayacucho, on abandoned site of what was formerly the village of Zamuro. About 90 yards (82 meters) from boat landing (a large rock), 96 feet (29 meters) from northeast corner of remains of old foundation; 50 feet (15 meters) from center of more westerly of two large rocks; not marked. True bearing: tree on opposite shore of river, 133° 03′.1.

ISLANDS, ATLANTIC OCEAN

Iceland

Reykjavik, Engey Island, 1928.--Station A of 1914 was reoccupied, a close if not exact reoccupation, on an open grass plot on Engey Island, about 2 miles (3.2 kilometers) across harbor northward from Reykjavik, about 100 yards (91 meters) northwest of dwellings of two farmers who own the island, about same distance from north end of island, 90.08 meters northwest of small red light beacon standing near farm dwellings; not marked. True bearings: observatory tower, 6° 26′.6; spire on old Catholic Church, 25° 35′.8; Grotta lighthouse, 78° 28′.7; church spire at Akranes, 153° 03′.1.

West Indies

Bathsheba, Barbados, 1931.--Probably a close reoccupation of CIW 1908 station, in open space in front of and belonging to Beachmont Hotel, about 0.12 mile (200 meters) northwest of Atlantis Hotel, 89.9 feet (27.42 meters) north of hotel flagpole base, 222.0 feet (67.71 meters) from northeast bottom corner of steps from smaller enclosure around hotel building, and 76.5 feet (23.33 meters) southwest of a large rock; marked by a cross in a rough stone about 18 inches (46 centimeters) long set almost flush with ground surface. True bearings: lone palm tree at police station, 3 miles (4.8 kilometers), 97° 37′.7; point of pyramidal roof on gray stone house, 0.75 mile (1.2 kilometer), 109° 07′.2; end of ridgepole of north wing of Atlantis Hotel, 289° 33′.8.

Bridgetown, Barbados, 1928, 1931.--Three stations were occupied. Station A was exact reoccupation of CIW station of 1908, 1919, and 1923, on old Naval Hospital grounds, about 200 yards (180 meters) northeast of Marine Hotel, on land belonging to Mr. Finch, about 300 feet (91 meters) southeast of CIW station of 1905, 121.8 feet (37.12 meters) west-northwest of inside corner in stone wall along east boundary of grounds, and 26.8 feet (8.17 meters) nearly north of Transit of Venus pier; marked by a limestone post inscribed "CI 1908." True bearings: staff at east end of house roof, 400 feet (120 meters), 21° 25′.5; north corner of Marine Hotel (near roof), 77° 52′.6; lone tall straight royal palm, 2 miles (3.2 kilometers), 241° 47′.7; windmill on distant hill, 244° 46′.9.

Station B was exact reoccupation of CIW station B of 1923, 271.2 feet (82.72 meters) north-northeast of A, on the same tract of land, almost in line between A and large tree near north wall of enclosure, about 90 feet (27 meters) north-northwest of remains of old cistern, 81.4 feet (24.83 meters) south of north wall, and 106.2 feet (32.39 meters) west of east wall around property; marked by cross on large stone projecting 2 inches (5 centimeters) aboveground and lettered "CI." True bearings: flagpole in line with station A, 21° 25′.5; base of wind vane on Marine Hotel, 53° 30′.0.

Station D was chosen 50 feet (15.2 meters) east of A for intercomparisons of instruments. There was a level grassy area between the two stations.

Cayo Frances, Cuba, 1927.--Near Cayo Frances lighthouse; marked by concrete pier bearing inscription "CI Party, Abril 26/12, W.J.M., L.S.K., A.N., B.H." True bearing: lighthouse, 798 feet (243.2 meters) 104° 29′.9.

Havana, Casa Blanca, Cuba, 1931.--Two stations were occupied. Station A was close reoccupation of CIW station A of 1922 and 1924, on military reservation adjoining Morro Castle, about 300 yards (275 meters) northwest of Cuban National Observatory, 15.6 feet (4.75 meters) northwest-by-north from a boundary monument 6 feet (1.8 meter) high and nearly 2 feet (0.6 meter) square; marked by a cross cut in a firmly-embedded natural rock. True bearings: flagpole on Cabanas Fort, 82° 38′.6; tip of telephone pole, about 200 yards (180 meters), 195° 16′.8; spike on water tank, 0.50 mile (0.8 kilometer), 262° 27′.0.

Station B was exact reoccupation of CIW 1924 station, on same military reservation as A, 240.1 feet (73.18 meters) from A in direction west 7° 56′ north, and about 120 yards (110 meters) southeast of barracks; marked by cross cut in natural rock. True bearings: tip of dome of capitol in Havana, 51° 16′.9; tip of searchlight-tower on Morro Castle, 105° 28′.0; station A, 277° 56′.3; left-hand tower on same building, 301° 16′.3; tip of right-hand tower on Immigration Building, 304° 32′.1; flagstaff on National Observatory, 338° 16′.3.

ISLANDS, ATLANTIC OCEAN

West Indies--continued

Kingston, Jamaica, 1931.-- Three stations were occupied. Station A was exact reoccupation of CIW station B of 1922, about 2 miles (3 kilometers) west of Kingston on road to Spanish Town, on farm owned by G. W. Bourke, on Kingston side of harbor opposite Port Royal, 60 feet (18.3 meters) south 69° 08′ west from a large guango tree 36 inches (90 centimeters) in diameter near its base. No azimuth observations were possible owing to dense growth of trees around station, hence former value of azimuth was used; marked by cement post 5 inches (13 centimeters) square, projecting 2 inches (5 centimeters) aboveground, and lettered "CIW 1922." True bearing: lookout tower at Port Royal, 29° 51′.2.

Station B was about 6 miles (10 kilometers) north of city of Kingston, on northwest part of cricket field belonging to the government reform school for boys, 130.4 feet (39.77 meters) due east of southeast corner of carpenter's house and in line with south wall of house, 91.3 feet (27.85 meters) [or possibly 98.4 feet (30.01 meters)] from southwest corner of small concrete magazine building, 267.8 feet (81.68 meters) from northwest corner of carpenter shop, 279.5 feet (85.25 meters) from corner of terrace wall at south side of steps leading from terrace to cricket field; marked by a deep cross cut in top of a rough stone, approximately 8 by 8 by 20 inches (20 by 20 by 50 centimeters), set with top 2 inches (5 centimeters) below ground surface. True bearings: small gable on roof of middle house at wireless station, 51° 26′.2; southwest corner of magazine building, 198° 05′.2; northwest corner of carpenter shop, 252° 09′.3; first figure 1 of date 1918 over door of school building, 286° 34′.1; corner of terrace wall, south side of steps, 287° 57′.0; extreme right-hand corner of school building, 3 feet (1 meter) aboveground, 296° 51′.3.

Station C was on summit of Warieka Hill just east of city of Kingston, on property belonging to Mr. Mc Dougal, 35.4 feet (10.80 meters) west-by-south of a large double tree, 136.3 feet (41.57 meters) northwest of center of northwesterly wing of a cottage, and 62.8 feet (19.15 meters) from a West Indian willow tree at the roadside towards the south; not marked. True bearing: Plum Point lighthouse, 3 miles (5 kilometers), 25° 36′.9.

Matanzas, Cuba, 1931.--Close reoccupation of CIW 1922 station, on grounds of Chapel of Monserrate, about 2 miles (3 kilometers) northwest of city, on high hill facing Yumuri Valley, 98.8 feet (30.13 meters) west of northwest corner of chapel, 112.9 feet (34.43 meters) from southwest corner of chapel, 79.4 feet (24.22 meters) north-by-west of CIW 1905 station, and 11.8 feet (3.60 meters) from bottom of stone wall to north; not marked owing to hard rocky nature of soil (stone slab placed in 1922 could not be found). True bearings: south gable of small house, about 1 mile (1.6 kilometer), 182° 04′.5; extreme right-hand corner of house, about 1.5 mile (2.5 kilometers), 188° 19′.2.

Montego Bay, Jamaica, 1931.-- Two stations were occupied on property known as Jarrett Park about 1 mile (1.6 kilometer) southwest of the town. Station A was a close reoccupation of CIW station of 1922, 97.1 feet (29.60 meters) east of fence along westerly side of property, 77 feet (23.5 meters) southwest of large rock just south of path leading to cricket field, 64.6 feet (19.69 meters) south-southeast of a tree also south of path to cricket field; marked by a cross cut in a naturally-embedded rock flush with surface of ground. True bearings: west end gable of gray house on hill, 184° 32′.7; east end gable of same house, 185° 08′.4; station B, 304° 22′.0; north end gable of shed near large stack, 323° 46′.7; northwest corner at top, of sugar-mill stack, 328° 56′.5.

Station B was 355.4 feet (108.33 meters) southeast of A and 153.0 feet (46.63 meters) from the boundary fence toward the west; marked by a cross cut in a naturally-embedded rock flush with surface of ground. True bearings: station A, 124° 22′.0; west gable of gray house on hill, 178° 48′.6; northeast corner of brick chimney of sugar mill, 335° 48′.2.

Pinar del Rio, Cuba, 1931.--Proximate reoccupation of CIW 1922 station, in northwest part of town, on grounds of Sanitorio Colonia Espanol, about 350 yards (320 meters) south-southwest of the 1922 station, 112.4 feet (34.28 meters) from northeast corner of X-ray building, 75.7 feet (23.09 meters) southwest of iron fence along road, 36.8 feet (11.22 meters) from most easterly row of trees, and 15.7 feet (4.79 meters) from the third tree in the row going westward; marked by a deep cross cut in a rough native stone set flush with ground surface. True bearings: center of dash in Colonia-Espanol on front of hospital building, 82° 01′.1; middle of heavy concrete post at south end of highway bridge entering city from north, about 1 mile (1.6 kilometer), 274° 41′.4; flagstaff at military headquarters, about 350 yards (320 meters), 335° 46′.8.

Port of Spain, Trinidad, 1931.-- Three stations were occupied. Station A was exact reoccupation of CIW 1905 station, in Queen's Park Savannah, about 0.33 mile (0.5 kilometer) north of Queen's Park Hotel, 732.0 feet (223.26 meters) northwest of "Savannah Referring Mark" used by Crown survey office, at intersection of meridian line with azimuth line extended from "referring mark" to spire of Laventille Roman Catholic Church, and 244 paces (200 meters) north of north wall of small cemetery; marked by hole in top of limestone post 6 by 6 by 30 inches (15 by 15 by 76 centimeters) lettered "CI 1905" and set flush with ground surface. True bearings: tip of tower on college building, 73° 48′.2; tip of dome on large house, 98° 49′.0; flagstaff on Governor's mansion, 200° 08′.4; spire of Laventille Roman Catholic Church and Savannah Referring Mark, 307° 48′.0; church spire seen left of grandstand, 341° 39′.5; tip of dome of government office building, 351° 42′.1.

Station B was at "Savannah Referring Mark," 732.0 feet (223.26 meters) southeast of A; marked by stone 15 by 15 inches (38 by 38 centimeters) at top and projecting 6 inches (15 centimeters) aboveground, the exact point being indicated by a hole in a small copper plate set in a depression in the stone. True bearings: station C, 15° 29′.0; tower of college building, 88° 08′.0; spire of Laventille Roman Catholic Church, 307° 48′.2; spire of Trinity Church, 352° 43′.1; tip of dome on government office building, 356° 48′.3.

Station C, used for diurnal-variation observations only, was under a large wide-spreading tree, about 183 paces (150 meters) south-by-west from B, 16 feet (4.9 meters) east of the tree trunk; not marked. True bearings: flagstaff on house, seen over grandstand, 0° 33′.5; right-hand tower on Queen's Park Hotel, 31° 36′.5; station B, 195° 29′.0.

ISLANDS, ATLANTIC OCEAN

West Indies--concluded

San Fernando, Trinidad, 1931.--Exact reoccupation of CIW station of 1905 and 1923, 0.50 mile (0.8 kilometer) south of town, in southwestern part of government pasture and recreation grounds known as Paradise Savannah, on hill near large tree, about 400 feet (120 meters) west of armory, and about 250 feet (75 meters) from fence on west side of the enclosure; marked by granite stone 6 by 6 by 36 inches (15 by 15 by 90 centimeters) projecting about 7 inches (18 centimeters) aboveground and lettered "CI 1905." True bearings: spire of Anglican Church, 228° 50'.7; spire of Wesleyan Church, 243° 40'.9.

San Juan Magnetic Observatory, Puerto Rico, 1931.--Simultaneous observations for comparisons of instruments with the observatory standards were made at three stations, the magnetometer and earth inductor piers in the observatory, and a tent-station outside which is a triangulation-marker set in concrete about midway between the absolute and variation buildings, and about 40 feet (12 meters) from the magnetometer pier in the absolute building. The Morro Light bears 176° 25'.6 from the magnetometer pier and 176° 23'.2 from the tent station.

Santiago de Cuba, Cuba, 1931.--Three stations were occupied. Station A was about 200 yards (180 meters) almost due west of CIW station A of 1922 which could not be reoccupied owing to extensive alterations affecting the entire summit of San Juan Hill, on grounds of military reservation, 401.3 feet (122.40 meters) from center of gateway to grounds measured along middle line of drive projected across cultivated plot of ground to edge of wide deep ravine, 25 feet (7.6 meters) from edge of ravine, and 228.7 feet (69.75 meters) from northwest corner of small cement cookhouse; marked by cross cut in top of rough native stone, about 7 by 10 inches (18 by 25 centimeters) set flush with ground. True bearings: top of water tank, 0.50 mile (0.8 kilometer), 50° 15'.3; flagstaff on large building, 300 yards (275 meters), 210° 49'.8; flagstaff on San Juan Hill, 260° 38'.4.

Station B was about 6 miles (10 kilometers) north-by-east of the city, on grounds of Santiago Country Club, about 300 yards (275 meters) southwest of site for permanent clubhouse which had not yet been built, between eleventh fairway and lower end of practice ground, 83.3 feet (25.41 meters) south of large acacia tree, deformed by large bulge about 5 feet (1.5 meter) aboveground, 53.9 feet (16.44 meters) southeast of a double tree 68.5 feet (20.89 meters) southwest of the acacia tree, and 79.5 feet (24.25 meters) northeast of a larger double tree; marked by a heavy stake of extremely hard, well-seasoned wood, 2.75 inches (7.0 centimeters) in diameter, driven almost flush with ground. True bearing: top of water tank on grounds, 240° 52'.6.

Station C, an auxiliary station, was 57 feet (17.4 meters) southwest-by-west from A; not marked. True bearings: gable of building to northwest, 134° 42'.2; lightning rod on school building, 211° 30'.2; fence post near telephone pole, 262° 01'.7.

ISLANDS, INDIAN OCEAN

Zanzibar Protectorate

Zanzibar, 1931, 1934.--Two stations were occupied. Station A was exact reoccupation of CIW station of 1921, in west corner of Recreation Park, 186 feet (56.7 meters) from Mnazi Moja Road, measured at right angles from a point 327 feet (99.7 meters) southeast along road from point opposite southeast side of memorial to General Matthews, 339 feet (103.3 meters) east-southeast of south apex of triangular enclosure around memorial, 419 feet (127.7 meters) northeast of angle in cemetery wall, and about 20 feet (6 meters) from a manhole opening at a joint in a buried tile pipe (manhole cover of reinforced concrete to be removed during observations); marked by cement block 6 by 6 inches (15 by 15 centimeters) square, set 6 inches below surface, exact spot being indicated by a sinkhole. True bearings: bottom left edge of pavilion at corner of Mnazi Moja Road and Creek Road, 250 feet (76.2 meters), 99° 52'.2; bottom of Matthews memorial just above steps, 108° 05'.2; top of steeple of English Cathedral, 182° 42'.6; steeple of clock tower at government stables, 185° 14'.5; bottom center of wireless mast, 199° 51'.6; edge of house to southeast, 0.2 mile (0.6 kilometer), 317° 54'.1.

Station B was on the grounds of the British East Africa Meteorological Office, the former palace at Chukwani, about 7 miles (11 kilometers) south-southeast of the town of Zanzibar, about 400 feet (122 meters) south-southeast of the southeast corner of palace, and 300 feet (91 meters) northeast from the beach in an area of grass and palms. The larger of two piers was used for observations, the smaller as galvanometer pier. True bearings: center of dome of lighthouse, about 1.5 mile (2.5 kilometers), 49° 57'.8; left edge of nearest building, 200 feet (61 meters), 135° 13'.4; right-hand edge of residence building, 190° 17'.6.

ISLANDS, PACIFIC OCEAN

Bismarck Archipelago

Kavieng, New Ireland, 1936.--Located at a point where the road leading east-southeast from the jetty over a low hill makes a sharp turn towards north, about 0.50 mile (0.8 kilometer) from the jetty, 12 feet (3.7 meters) south of the south boundary of the road; marked by a 2 by 2 inch (5 by 5 centimeter) peg driven flush with ground surface. True bearing: lower left corner of louver window on customs shed, 107° 28'.0.

Lombrum, Admiralty Islands, 1936.--Observations for azimuth and declination were made on the foreshore at a point about 900 feet (274 meters) west-southwest of landing jetty and about 100 feet (30 meters) from high-water mark, at the rear of a row of native huts; not marked. True bearing: conspicuous white tree on opposite side of harbor (viewed across jetty), 257° 27'.8.

Pondo, New Britain, 1936.--On foreshore, on a point of land about 0.33 mile (0.5 kilometer) south-southeast of jetty, about 20 feet (6.1 meters) from high-water mark;

ISLANDS, PACIFIC OCEAN

Bismarck Archipelago--concluded

not marked. True bearing: near gable end of large shed at wharf, 103° 55'.8.

Rabaul, New Britain Island, 1936.--Proximate reoccupation of CIW station of 1915 and 1921, near northwest corner of cricket oval due eastward of the new wing of Rabaul Hotel, 12.5 feet (3.81 meters) from shrub border forming boundary of cricket ground; marked by concrete survey post (supplied by Department of Lands and Surveys, Rabaul) 4 by 4 inches (10 by 10 centimeters) set flush with surface of ground. True bearings: base of flagpole on east end of cricket pavilion, 54° 17'.9; ornament on center of new wing of Rabaul Hotel, 99° 17'.3; left end of roof ridge of baseball pavilion, 147° 35'.3; ornament on east gable end of Pacific Hotel, 160° 03'.2; triangulation mark on Mount Mother, 289° 29'.9.

Easter Island

Cook Bay, 1928.--A close reoccupation of CIW station of 1916. The concrete block marking the former station had been broken up and the site planted with sweet potatoes. The 1928 station was 6 feet (1.83 meters) south of line joining old barrel beacon and triangular beacon, 40 paces from the broken up pile of rocks marking site of old barrel beacon, 27 paces south of stone fence, and 6 paces west of sweet potato patch; not marked. True bearings: right edge of house to south (Victoria), 18° 23'.5; base of beacon at landing, 211° 00'.0; west edge of house to north, 213° 50'.1; flagpole at gable on governor's house, 258° 07'.2; flagpole at Plaza, 267° 53'.8; cross on chapel, 271° 28'.6; triangular beacon, 318° 45'.2. The inclination observations were made at a secondary station 5 feet (1.52 meters) south of the principal station.

Fiji Islands

Suva, 1937.--Probably a close reoccupation of CIW "base-station" of 1906, on a high knoll about 1 mile (1.6 kilometer) northeast of the Suva main wharf, and overlooking the native prison and asylum; marked by a copper tack in top of concrete post 6 by 3 inches (15 by 8 centimeters) projecting 3 inches (8 centimeters) aboveground and lettered "TM." As the station may be difficult to find, the Lands Department in Suva has promised to keep the site open, and will furnish a guide on request. True bearings: left side of "Joske's Thumb," 106° 15'.2; trigonometric marker on Korombamba Mountain, 128° 20'.0; trigonometric marker on Kombelevu Mountain, 164° 50'.2; flagpole at signal station, 342° 52'.7.

Galapagos Islands

Albemarle Island, 1935.--On the southwest coast of the island, in Webb Cove, northeast of Christopher Point, about midway between St. John Point and a small crater to the northeast, approximately 100 feet (30 meters) inland from a fairly good landing beach, on flat land covered with lava boulders. The coast is escalloped and no good landmarks are evident. For azimuth mark, the theodolite plumbline a short distance away was used. The station was not marked. Reference is made to U. S. Hydrographic Office Charts, Nos. 1798 and 1801.

Gilbert Islands

Apiang Island, 1937.-- On narrow grassy stretch between main road which runs the whole length of the island and foreshore, about 350 feet (107 meters) south of jetty at government landing, 11.5 feet (3.50 meters) from near boundary of road, 71.8 feet (21.88 meters) to near corner of walk leading to government resthouse, 59.0 feet (17.98 meters) from near corner of large canoe shed; not marked. True bearing: tree on One-Tree Island, about 6 miles (10 kilometers), 58° 05'.9.

Arorai Island, 1937.-- Near western corner of enclosure around government resthouse on eastern shore of island immediately opposite government landing place on the west, or lagoon side, of the island, in line with southwest boundary of enclosure, and 5.0 feet (1.52 meter) from the west corner; not marked. True bearing: mark on coconut tree to south, 0° 52'.7.

Nonuti Atoll, 1937.--Practical reoccupation of CIW station of 1915, near western edge of narrow field of land about 0.25 mile (0.4 kilometer) north of Temotu village, about midway between a large canoe shed to the south and a large hut to the north, about 40 feet (12 meters) from the edge of a sandy beach; not marked. True bearing: left edge of ruin on small island, 58° 24'.2.

Ocean Island, 1937.--Proximate reoccupation of CIW station of 1915, near southwest end of rifle range at north end of island, about 0.33 mile (0.5 kilometer) northeast of rifle clubhouse, in line with a concrete survey monument and an iron flag socket close to the first mound of the rifle range, 31.4 feet (9.57 meters) from the survey monument, and 39.7 feet (12.10 meters) from the flag socket; marked by a stake to be replaced later by a concrete marker. True bearing: north corner of rifle clubhouse, 64° 30'.8.

Declination was also observed at a secondary station near the beach at Soloman's Point at the southern extremity of the island; not marked. True bearing: ventilator on large concrete water tank near native village across bay, 117° 30'.4.

Tapeteuea Island, 1937.-- Near south corner of enclosure containing government resthouse facing foreshore immediately south of landing jetty and flagpole, 24.4 feet (7.44 meters) from southeast fence of enclosure, and 41.8 feet (12.73 meters) from the southwest fence. Station was well covered by coconut palm trees, and declination observations were made at a spot 30.5 feet (9.30 meters) to the southwest: unmarked. True bearing (from declination station): beacon on a reef, 23° 36'.8.

Hawaiian Islands

Sisal, Honolulu Magnetic Observatory, Oahu Island, 1937.-- Intercomparison observations, with interchange of stations, were made between CIW magnetometers Nos. 13 and 28 and Coast and Geodetic Survey magnetometer Cooke No. 40 and earth inductor Schulze No. 4. Station A was the regular absolute observatory, and station B was a small hut just outside the observatory enclosure and in line with the north meridian mark. This mark bears true north from both stations.

ISLANDS, PACIFIC OCEAN

Malay Archipelago

Batavia Observatory, 1938.--Intercomparisons were made between CIW magnetometer inductors Nos. 13 and 28. Also, No. 28 was compared with the observatory standard instruments including an Adie declinometer, an Elliott magnetometer, and Schulze earth inductor No. 47. All instruments were mounted on piers in the absolute observatory.

Marianas Islands

Guam, Sumay, A, 1929.--A close reoccupation of station A of 1916, on open and slightly rising ground between the main buildings of the cable station and the bungalows used as quarters for married officials, in line with northern backstop of concrete tennis court, 40.5 feet (12.34 meters) northwest of large banyan tree, and about 168 feet (paced) (51 meters) from northeast corner of near bungalow to south-southwest; marked by peg projecting 2 inches (5 centimeters) aboveground and covered with small cairn of whitewashed stones. True bearings: left edge of southeast pillar of near bungalow, 29° 44'.8; south ventilator on superintendent's house, 231° 00'.9; water tank on radio hill, 3 miles (4.8 kilometers), 258° 15'.2; south ventilator on mess house, 279° 11'.0.

Nauru

Nauru, 1937.--Near southern corner of Chinese sports ground about 0.7 mile (1.1 kilometer) north-northeast of harbor, 188.5 feet (57.45 meters) from near corner of concrete platform supporting sports pavilion, 94.8 feet (28.90 meters) from eastern goal post at the southern end of grounds; marked by a hardwood peg, 2 by 2 inches (5 by 5 centimeters), set just below ground surface. True bearings: gable of nearest messroom in Chinese compound, 35° 41'.2; base of flagpole on center of roof of sports pavilion, 152° 48'.9; eastern goal post at northern end of ground, 209° 16'.1.

New Caledonia

Bourail, 1937.--On sloping pasture land about 0.25 mile (0.4 kilometer) over the hill at the rear of Hotel Morlet, 76.4 feet (23.29 meters) from a wire fence bounding the grazing land on its eastern side, this measurement being taken in line with the school standing on top of the hill between the station and Hotel Morlet; marked by a wooden peg left level with the surface. True bearings: near gable of tall red iron building, 1 mile (1.6 kilometer), 127° 00'.8; left edge of top of tall brick chimney, 163° 18'.0; near gable end of school building, 254° 55'.8; top center of lamppost at street corner, 302° 17'.2.

Noumea, 1937.--Proximate reoccupation of CIW stations of 1915 and 1922, on grounds of Government House on rising ground to east of Governor's residence, north of a series of ornamented flowered terraces running from the residence to foot of hill on which the signal station stands, 14.6 feet (4.45 meters) to north of nearest point of coral path bounding north side of terraced section of grounds, 72.5 feet (22.10 meters) west-northwest of junction of this path and a smaller path passing northward, and 44.8 feet (13.65 meters) from junction of this smaller path with another path passing along side of hill towards west-northwest; marked by a wooden peg left 1 inch (2 centimeters) above surface of ground. True bearings: center of top of tall chimney across harbor, 19° 51'.4; base of weather vane on Governor's residence, 68° 06'.1; top of flagpole at signal station on hill, 252° 43'.8; near corner of water tower on hill, 324° 01'.0.

New Guinea

Boram, 1936.--Located on small level area used as football field, about 700 feet (213 meters) southeast of Glasson and Ifould's Trading Store, 36.0 feet (10.97 meters) northeast of near edge of coral path which leads from landing place to trading store; unmarked.

Madang, 1936.--On foreshore, about 12 feet (3.6 meters) from high-water mark, west-southwest of jetty and about 800 feet (244 meters) east of hospital buildings, 8.5 feet (2.59 meters) west of northernmost tree of a row of tall casuarina trees; marked by a stake driven flush with the surface of ground. True bearings: east gable end of iron shed on island across harbor, 166° 21'.8; top of navigation beacon across harbor, 222° 24'.3; north gable end of porch on front of shed at jetty, 249° 48'.6.

Port Moresby, 1936.--Practical reoccupation of CIW station B of 1915, in west corner of police parade ground, 105 feet (32.0 meters) from west corner post of fence, 91 feet (28 meters) from fence along southwest side of grounds measured past a tree 25 feet (7.6 meters) from the fence; not marked. True bearings: top of right-hand strainer at fence corner, 104° 27'.6; top center of lower section of flagpole, 189° 20'.2; top of middle ventilator on police quarters, 250° 38'.8; center peak of roof on house to south, 343° 43'.4.

Salamaua, 1936.--Near north corner of Logui aerodrome, about 2 miles (3 kilometers) northwest of Salamaua, exactly over center of concrete block used for adjusting aeroplane compasses and which had eight similar blocks around it in a circle of about 24 feet (7.3 meters), these blocks being 45° apart. True bearing: base of pole of wind indicator on front gable of Carpenter's Hangar, 13° 27'.2.

Samarai, 1936.--Practical reoccupation of CIW station of 1915 and 1921. In recreation ground near southeast boundary, at apex of equilateral triangle, base of which was formed by line between two breadfruit trees 32.6 feet (9.94 meters) apart; not marked. True bearings: right gable of police quarters, 8° 45'.4; near gable of pavilion, 94° 32'.6; near corner of base of Robinson Monument, 162° 00'.0; near rear gable of house, 263° 43'.2.

Wiewak, 1936.--Near center of football ground, about 400 feet (122 meters) west of west corner of native police barracks, 39 feet (11.9 meters) north of nearest point of coral path leading from jetty westward across peninsula, 33 feet (10.0 meters) north of concrete survey marker, and 24 feet (7.3 meters) east of stump of coconut tree; unmarked. True bearing: veranda post on jail, visible over police barracks, 261° 29'.5.

ISLANDS, PACIFIC OCEAN

New Hebrides

Luganville, Santo Island, 1937.-- A close reoccupation of CIW station of 1922, in a clearing in front of manager's house, about 600 feet (183 meters) west of large copra shed at jetty, in line with right edge of left brick steps leading to veranda of manager's house and also in line with the south face of a store building immediately west of the copra shed. True bearings: right corner of roof of large shed on south shore of canal, 10° 28′.9; right edge of left brick steps leading to veranda of manager's house, 143° 28′.3; right edge of front of store, 258° 06′.8.

Port Patterson, Banks Islands, 1937.-- On foreshore between landing place and manager's residence, 27 feet (8.2 meters) from a tree stump 7 feet (2 meters) high, and 42.5 feet (12.95 meters) from the nearest point of a thatched pavilion which was practically in line with the tree stump and the station; marked by a tent peg driven flush with surface and covered with a cairn of coral rock. True bearing: near gable of large iron shed across harbor, about 0.50 mile (0.8 kilometer), 76° 39′.1.

Port Vila (Fila), Sandwich Island, 1937.--Exact reoccupation of CIW station of 1922 and close reoccupation of station of 1915, on vacant land to east of a road which leads up a steep hill from the water front, past the south side of the post-office building toward the Protestant Church and the British Residency Offices, 25.2 feet (7.68 meters) north-northeast of a charred tree stump, 78 feet (23.8 meters) from center of road, and 50 feet (15 meters) south of narrow path leading eastward from the road and turning northward toward the French Offices; marked by small hole in top of cement block 6 by 6 by 18 inches (15 by 15 by 46 centimeters) lettered "CIW 1922," set level with ground surface. True bearings: tip of steeple on Protestant Church, 600 feet (183 meters), 1° 54′.5; top of lower section of flagpole at British Residency, 1.5 mile (2.4 kilometers), 52° 58′.7; right edge of post-office building, 800 feet (244 meters), 88° 45′.9; top of lower section of flagpole in front of French Offices, 800 feet (244 meters), 168° 10′.8.

Samoa Islands

Apia, Samoa Observatory, Upolu Island, 1937.-- Intercomparison observations, with change of stations, were made between CIW magnetometers Nos. 9 and 28 and between earth inductors CIW No. 28 and Schulze No. 2 at the north and southeast piers in the absolute observatory and also at a cedar pier located a short distance west of the absolute observatory and in line with north pier and Tuamua Church spire across the bay. True bearing: from north pier in absolute observatory, and also from cedar pier, the spire of Tuamua Church bears 96° 10′.9.

Society Islands

Motu-Uta Island, Papeete Harbor, 1937.-- Close reoccupation of CIW station of 1907, on eastern side of Motu-Uta Island (quarantine station), about 15 feet (4.5 meters) from high-water mark; marked by a wooden peg left 2 inches (5 centimeters) aboveground. True bearings: east corner of hospital, 87° 02′.6; north corner of hospital, 94° 15′.9; front gable of seaplane hangar at Point Fareute, 244° 33′.9; cathedral spire, 297° 12′.6.

Papeete, Tahiti Island, 1937.-- Two stations were occupied. Station A was an approximate reoccupation of CIW stations of 1907, 1912, 1916, and 1922, on government land used as an experimental horticultural station, on south side of Rue Clemenceau, about 300 yards (274 meters) east of museum, in line with eastern side of gardener's house, also in line with south side of small experimental enclosure, 34 feet (10.4 meters) and 74 feet (22.5 meters), respectively, from southeast and northeast corners of the same enclosure, and 156.0 feet (47.55 meters) from southeast corner of gardener's house; marked by 2 by 2 inch (5 by 5 centimeter) wooden peg driven flush with ground surface. True bearing: southwest corner of gardener's house, 149° 05′.9.

Station B was 66 feet (20.1 meters) southeast from A, near edge of area at present planted, and probably about midway between A and the stations of previous occupations; not marked. True bearing: southwest corner of gardener's house, 146° 04′.5.

Taravao, Tahiti Island, 1937.-- Two stations were occupied. The location was a proximate reoccupation of CIW station of 1916, being about 0.5 mile (0.8 kilometer) west-southwest of location of former station. Station A was on open land on north side of main road and immediately east of the cinema which was opposite the Chinese restaurant, in line with southern end (front) of cinema, 50.4 feet (15.36 meters) from fence which divided the open land from a plantation to west, and 46.0 feet (14.02 meters) from fence on top of bank at north side of main road; marked by wooden peg left 1 inch (2.5 centimeters) above surface. True bearing: left sash in attic window of house to south, about 350 feet (100 meters), 10° 56′.7.

Station B was 52.5 feet (16.00 meters) north of A and 33.8 feet (10.30 meters) from the dividing fence; not marked. True bearings: left edge of attic window of house to south, about 400 feet (125 meters), 1° 27′.1; left gable of cinema, 247° 28′.7; right gable of cinema, 261° 24′.1.

Tautira, Tahiti Island, 1937.--Two stations were occupied. Station A was on open space used as football ground, immediately east of main church and south of road through the village of Tautira, near goal posts at southern end of grounds, 48.2 feet (14.69 meters) from the western goal post and 48.6 feet (14.81 meters) from the eastern goal post, 134.6 feet (41.03 meters) from southeast corner of church; marked by 2 by 2 inch (5 by 5 centimeter) wooden peg driven slightly below surface. True bearings: corner post of house to south, 1° 35′.7; northeast corner of church, 153° 11′.1; left goal post at northern end of ground, 189° 30′.3.

Station B was 106.5 feet (32.46 meters) north of A, in line with southern side of church and 100.4 feet (30.60 meters) from its southeast corner; not marked. True bearings: sash of window in house to south, 0° 00′.4; northeast corner of church, 117° 50′.9; left goal post at northern end of ground, 189° 02′.4.

Solomon Islands

Faisi Island, 1936.-- Proximate reoccupation of CIW station of 1915 and 1921, probably less than 0.25 mile

ISLANDS, PACIFIC OCEAN

Solomon Islands--concluded

(0.4 kilometer) from location of former station, 15.5 feet (4.72 meters) from eastern edge of path from jetty past manager's bungalow to northern end of island, in line with northeast fence of garden around manager's bungalow, also in line with northwest (front) fence around bungalow which was on the same side of the path as was the station; marked by a 2 by 2 inch (5 by 5 centimeter) peg left level with ground surface. True bearing: gable end of left-hand shed at jetty, 83° 25'.4.

Gizo, 1936.-- Proximate reoccupation of CIW stations of 1915 and 1921, near shore end of small stone jetty which is about 1000 feet (305 meters) east of main jetty and storehouses, 46 feet (14.0 meters) north of the near edge of a path which runs from main jetty along the coast eastward; not marked. True bearings: east corner of eave on shed on the jetty, 104° 05'.2; near gable end of large red shed on Chinaman's Island, 158° 52'.0; near gable end of tall building on west end of island across the harbor, 191° 52'.4.

Makambo Island, 1936.-- Practical reoccupation of CIW station of 1915, on small level area in the saddle near the middle of the range of hills which form the backbone of the island, immediately north of and overlooking new tennis court; marked by hardwood peg projecting just above surface of ground. True bearings: base of flagpole at Government House, Tulagi, 26° 53'.7; west gable end of Burns Philp Office on Makambo Island, 6° 41'.0.

Maringe Lagoon, Ysabel Island, 1936.--Near seaward end of narrow point of land about 700 feet (213 meters) northwest of landing place, about 800 feet (244 meters) east-northeast from the manager's bungalow, and about 25 feet (7.5 meters) from high-water mark; not marked. True bearing: right-hand channel marker, 312° 29'.4.

Numa Numa, 1936.-- On foreshore about 0.50 mile (0.8 kilometer) westward of jetty and sheds, about 60 feet (18 meters) seaward of large Kareela tree which stood out prominently among the coconut palms, about 300 feet (91 meters) eastward of two triangular leading marks; not marked. True bearings: rear leading mark, 56° 57'; front leading mark, 75° 44'; left edge of channel marker on reef, 178° 43'; north gable of long shed near landing, 249° 38'.

Teopasino, 1936.-- On foreshore near extreme eastern point of bay, about 600 feet (183 meters) east of landing place and about 400 feet (122 meters) northeast of manager's bungalow, which was hidden by trees; not marked. True bearing: prominent white tree across harbor, 136° 44'.8.

ANTARCTICA

Stations in this division are mainly designated by number and are described only by their latitudes and longitudes, which are given in the table of results. Few points of reference were available for more complete descriptions of the stations, and station markers themselves never remained in their original locations but moved with the slowly moving ice.

OCEAN MAGNETIC OBSERVATIONS, CRUISE VII OF THE CARNEGIE, 1928-1929

OCEAN MAGNETIC OBSERVATIONS, 1928-1929

INTRODUCTION

The magnetic work on Cruise VII was done primarily to secure information concerning the secular variation in terrestrial magnetism, and the route of the vessel was planned to follow as closely as practicable the routes of previous cruises. The program of observation was arranged so that measurements of horizontal intensity and inclination of the Earth's field were made only once every two days, in the morning hours whenever possible, and measurements of declination or compass variation were made twice daily when weather permitted, in the early morning and early evening when the Sun was at a suitable height above the horizon. Curtailment was thus made in observations of horizontal intensity and inclination in comparison with the programs of previous cruises; for on the earlier cruises, measurements of these elements had been made daily and sometimes more than once each day.

Further curtailment in magnetic work was brought about by eliminating duplicate observations of the various elements, a procedure which had been followed regularly on previous cruises. The results of earlier cruises had shown that certain methods and instruments were more reliable than others, and only the most satisfactory were retained for use on Cruise VII. The curtailment of the magnetic program made possible a very substantial program of observation in physical and biological oceanography.

INSTRUMENTS AND METHODS OF OBSERVATION

General.--On Cruise VII magnetic declination was determined with a marine collimating-compass only, and the use of the deflector-method was eliminated; horizontal intensity measurements were made only with a deflector, the use of the dip circle was eliminated, and the magnetic inclination was obtained with a marine earth inductor, the dip circle not being used for this work on Cruise VII.

Measurement of Declination.--Marine collimating-compass No. 1, designated C1, which was used on all previous cruises of the *Carnegie* for measurement of declination, was used also throughout Cruise VII. Before Cruise VII began, the collimating-compass was completely reconditioned in the instrument shop at the Department, and it performed very satisfactorily throughout the cruise. Its location, as formerly, was on a small circular platform on the roof of the chart-room, midway between the two observing domes which housed the other magnetic instruments. A complete description and views of this instrument, the general formulae governing its use, the method of observation, and the instrumental constants have been presented in Volume III of this series[1] on pages 177-190, and samples of forms used for recording and computation of data appear in the same volume on pages 213-215.

Measurement of Horizontal Intensity.--Sea-deflector No. 5 (D5) was first supplied to the *Carnegie* in April, 1916, and was used late in Cruise IV and on Cruises V, VI, and VII for measurement of horizontal intensity. Deflector D5 differed from earlier models in several respects; the earlier models have been described and new features of D5 noted in Volume III already referred to, on pages 190-195.[1] Forms for recording and computing the observations have been shown on page 215 of Volume III. Deflector D5 was located in the after-dome throughout Cruise VII.

Preliminary values of H were computed regularly during the cruise, using the instrumental constants derived from comparisons at Washington immediately before the cruise began. During the cruise, comparisons were obtained at five additional shore stations between the deflector and the standardized magnetometers, Nos. 12 and 24, belonging to the vessel's outfit. After the cruise, the final constants were computed from the results obtained at the six shore stations. Using these revised constants, the values of H were recomputed for 19 days distributed over the cruise. In almost all cases, the agreement was exact to the third decimal. In a few cases, the difference was only one unit in the third decimal.

Measurement of Inclination.--Inclination measurements were made on Cruise VII with marine earth inductor No. 7. This instrument was first supplied to the *Carnegie* in 1917 and was used during Cruise VI as well as on Cruise VII. It was of similar design to inductor 3 which has been described in Volume III[1] on pages 196-202, but a few minor mechanical improvements were incorporated in it. Specimen forms for recording and computing of inclination data have been given on pages 223 and 224 of the same volume. Inductor No. 7 was located in the forward dome throughout Cruise VII.

On Cruise VI, inductor No. 7 was used with a galvanometer of the moving-coil type, but on Cruise VII the observations were made with a microammeter. Figure 1 illustrates the setup used for the measurement of inclination. Here the earth inductor (EI) mounted on double gimbals, carried a commutator-coil which was driven at constant speed by a tuning-fork controlled rotary-converter located in the after part of the vessel. The drive was transmitted by bronze shafting and through a universal joint at the center of gimbal-motion.

The earth-inductor coil was fitted with a two-segment commutator upon which rode plain strip brushes of phosphor bronze. A twisted pair of conductors lead through a conducting shield from the earth inductor in the forward dome to the control-room on the quarter-deck. Here the circuit passed through a coil (L) of high inductance and low resistance to a double-pole, double-throw switch, to one side of which was connected, through a reversing switch, a direct-current microammeter, and to the other side a portable Wheatstone's bridge.

With the circuit closed by the microammeter, the average current flowing depended on the position of the coil in the Earth's field and the dimensions of the coil, and was proportional to its speed of rotation and inversely proportional to the total resistance of the circuit. As a check on the constancy of the resistance of the circuit, the resistance of that part which was external to the microammeter was measured by the Wheatstone bridge at the beginning, at the mid-point, and at the end of the observations. This measurement was made of course with the earth-inductor coil stationary.

The purpose of the inductance, L, was to smooth out the fluctuations in the current. These fluctuations arose from two causes. One was the periodic fluctuation in speed of rotation of the coil when the portions of drive-shaft on each side of the universal joint were not parallel. The other cause was the oscillation of the gimbal-stand about the true vertical. Because of the difference between the cosine of an angle θ, and the mean of the cosines of $(\theta + \Delta\theta)$ and $(\theta - \Delta\theta)$, the average current passed by the inductance was not accurately independent of the motion of the gimbal-stand, but the inaccuracy was small enough to be neglected in marine measurements.

With the instrument oriented so that its vertical circle faced magnetic east, and with the rotation-axis of the coil free to be moved only in the vertical plane of the magnetic meridian, the rotation-axis of the coil was offset from the position of inclination until a current of three microamperes was indicated. The vertical-circle reading was taken and the coil then moved in the plane of the magnetic meridian until a current of three microamperes in the opposite direction was indicated. The vertical circle was again read and the mean of the readings constituted a measurement of inclination. These operations were then repeated for currents of two microamperes and one microampere. The graduated ring of the gimbal-stand was then turned through 180°, the rotation-axis of the coil was turned through approximately (180-I)°, and a similar set of observations were made. These 12 observations gave six measurements of magnetic inclination, I, from which a mean value was taken. The values of inclination thus obtained were reported to the nearest one-tenth degree, although the error was considered to be less than this under the most severe conditions at sea. In quiet water this method used on board checked with observations on shore to one-half minute.

Horizontal-Intensity Measurements with Inductor No. 7.--At the beginning of Cruise VII it was planned that the earth inductor should be developed for use in horizontal-intensity measurements in addition to using it regularly for measurements of inclination. Much work was done during the cruise in this direction, but the program remained an experimental one for the entire period, largely because the measurement of horizontal intensity by the earth inductor presented greater practical difficulties than did the measurement of inclination.

Routine measurements of horizontal intensity were made with the deflector located in the after dome of the *Carnegie*. The rapidity of such measurements and of earth-inductor measurements of inclination was to some extent a variable dependent on the motions of the vessel as affected by the weather. However, under weather conditions which required two hours for a complete deflector-determination of horizontal intensity, about half that length of time was necessary for the complete inductor-determination of inclination. Thus a short period of time, after completing the measurement of inclination, was available for experimental earth-inductor measurement of horizontal intensity simultaneously with the last part of the deflector-measurements. The intensity measurements of the deflector were used as a control for the experimental work of the earth inductor.

The first method of measuring horizontal intensity with the earth inductor on Cruise VII was selected for its simplicity. The setup was the same as indicated in Figure 1. The rotation-axis of the earth-inductor coil was vertical and the current commutated when the plane of the coil was perpendicular to the magnetic meridian. The commutated current set up in the closed circuit by the electromotive force induced in the rotating coil was directly metered by the direct-current microammeter. Under these conditions the horizontal intensity (H) was given by the formula

$$H = C\left[R \times 10^8 / \frac{4\pi n}{3}\left(\frac{r_2^3 - r_1^3}{r_2 - r_1}\right) N\right]$$

where C was the current in microamperes read from the direct-current microammeter, R the total resistance of the circuit in ohms, n the speed of rotation of the coil in revolutions per second, r_2 and r_1 the outer and inner radii, respectively, of the coil in centimeters, and N the number of turns in the coil. N, r_2, and r_1 were constants of the coil; n was considered sufficiently constant and known because the coil was driven by a constant-speed, tuning-fork controlled rotary-converter; and R was obtained as the sum of the microammeter-resistance computed from a basic known resistance and its temperature-coefficient, and the resistance of the circuit external to the microammeter as measured by the Wheatstone bridge before and after each current-measurement.

This method gave erratic results, was not particularly rapid, and had some outstanding disadvantages which it was desirable to eliminate. Consequently the current-method was abandoned and another method was used. This gave far more satisfactory results and consisted of the direct measurement of the generated electromotive force by means of an ordinary Leeds and Northrup type K direct-current potentiometer. Here the microammeter was used as a galvanometer for indicating the potentiometer-balance and acted as a current-integrating instrument. The setup used differed from that indicated in Figure 1 only in that the output from the reversing switch was led to the "EMF" terminals of the potentiometer. The electromotive force at the terminals of the earth inductor consisted of an unidirectional series of half sine-waves. At a condition of balance current would flow but the time-integral of the current in one direction was equal to the time-integral of the current in the opposite direction. This statement assumes perfect current integration by the microammeter. The inductance, L, here acted to reduce the amplitude of the fluctuations of the current about the mean. Assuming that the fundamental frequency of this fluctuation was twice the frequency of rotation of the coil, the inductance presented a reactance to the fundamental of about 50,000 ohms, whereas the total resistance of the circuit was about 300 ohms.

The procedure in measurement was to set the rotation-axis of the earth-inductor coil vertical with the brushes commutating when the coil was cutting no flux. A set of three readings was taken with the potentiometer. The horizontal circle of the earth inductor was then turned through 180°, the reversing switch was thrown in the opposite direction, and a second set of three readings taken. The gimbal-stand circle was then turned through 180°, the reversing switch again thrown, and a third set of three readings taken. The horizontal circle of the earth inductor was then turned through 180°, the reversing switch thrown, and a final set of three readings taken. The 12 readings were meaned for a determination of horizontal intensity.

The four different positions of the earth inductor were used to balance out irregularities of construction and lack of balance of the earth inductor, while the reversals thus occasioned balanced out such thermo-electromotive forces and contact-potentials outside the potentiometer as were steady; the multiplicity of readings took care, to some extent, of the unsteady extraneous electromotive forces.

From Callao, Peru, February 5, 1929, to arrival at Pago Pago, American Samoa, November 18, 1929, between 80 and 90 simultaneous comparisons were made between this method and the deflector at sea, under a variety of sea conditions, on all headings, at temperatures ranging from 12° C to 33° C, at inclinations varying from 0° to 67°.3, at horizontal intensities from 0.201 gauss to 0.360 gauss, on magnetically disturbed and quiet days, and at stations having a wide geographical distribution. With but few exceptions, the two methods checked to within one-half of one per cent. The ratios of deflector and earth-inductor values were all plotted against both temperature and inclination, but in neither case could a relation be shown. Some of the differences between deflector and earth-inductor values may have arisen from changes in coil-dimensions, caused by contraction and expansion of the bakelite spool with changes in humidity. This difficulty, if it existed, might be eliminated by winding a coil on a marble spool.

Unfortunately the experimental data were lost with the Carnegie; but those who were occupied with this work are in agreement on the above general statements of the performance. The records of the only direct comparison between this method and land magnetometer measurements were preserved. These measurements were made on July 31, 1929, when the Carnegie was swung in San Francisco Bay in the vicinity of Goat Island. This comparison is shown in Figure 2. Observatory traces from both Huancayo (Peru) and Mount Wilson showed disturbances during the comparison. In addition, the possibility of local disturbance was indicated by the greater amplitude of the Goat Island measurements. In any event, the agreement between the earth-inductor and magnetometer values was very encouraging and was better than the one-tenth of one per cent which had been considered the best which could be hoped for with the type of speed-control used. These shipboard measurements, however, were made under ideal conditions.

The chief need, which existed at the time the cruise was terminated, was for a more sensitive balance-indicator. It should be borne in mind, in designing future improvements, that any new instrument must contend with the effect of the ship's motion on any moving element. Steady motions of translation can of course be neglected. However, those motions involving acceleration, particularly roll and pitch, affect the accuracy of the earth-inductor method of measuring horizontal intensity in two ways, namely, in increasing the difficulty of determining the mean position of the microammeter-needle, and in producing departures from level of the earth inductor on the gimbal-stand. The motion of the coil-axis relative to the true vertical can be resolved into two components, namely, one in the vertical plane including the magnetic meridian and the other in the vertical plane perpendicular to the first.

In the first case, the effect is partially compensating, and the error introduced arises from the previously mentioned difference between a trigonometric function of an angle θ and the mean of the same functions of $(\theta+\Delta\theta)$ and $(\theta-\Delta\theta)$. In the measurement of inclination these errors are negligible because during any one set of observations the same errors will occur in each direction and will, to a large extent, cancel each other.

In the measurement of horizontal intensity, however, an absolute, rather than a relative, value is determined. In this case we will have an error introduced by the swing of the gimbal-stand in the vertical plane of the magnetic meridian. This error at any instant will be, proportionally

$$\left\{\cos I-\left[\cos\,(I+\Delta I)+\cos\,(I-\Delta I)\right]/2\right\}/\cos I$$

where I is the angle of inclination and ΔI is the angular displacement of the gimbal-stand from its normal position. The magnitude of the proportional error is independent of I and will depend only on ΔI. The motion of the gimbal-stand is oscillatory and if it be assumed simple harmonic then the instantaneous error produced by a displacement of ΔI will be the average error produced by a swing whose maximum displacement is $\Delta I\ (\pi/2)$.

The manner in which the average error varies with the maximum displacement of the coil axis from the true vertical is shown in Figure 3. From this it will be seen that a maximum displacement of about 4° is necessary to introduce an error of one-tenth of one per cent. This indicates that the ordinary motions of the gimbal-stand in this plane need not greatly concern us in marine measurements.

There remains to be considered the effect of motion in the vertical plane which is perpendicular to the vertical plane of the magnetic meridian. Referring to Figure 4, let I = inclination, F = total intensity = OA, Z = vertical intensity = CA, H = true horizontal intensity = OC, and H_1 = the projection of F on the normally horizontal plane of the earth inductor when rotated about the magnetic meridian through an angular displacement of θ. The angle between H and H_1 is ϕ from which $(H_1/H) = \sec\phi$. H_1 would be the quantity measured by the earth inductor if the brushes were shifted about the coil-axis AB by an angle ϕ so that H_1 would be perpendicular to the plane of the coil at the time of commutation. However, the brushes remain in their original vertical plane so that commutation takes place when the plane of the coil is perpendicular to H. Thus it will be seen that the average value of the electromotive force induced in the coil when in a roll of θ about the magnetic meridian is to the average electromotive force induced in the coil when its axis is vertical as the algebraic sum of the areas of Figure 5(A) is to the algebraic sum of the areas of Figure 5(B).

Let this ratio of average electromotive forces be called A. Then if ψ represent the angle of rotation of the coil

$$A = \frac{\int_0^{180^\circ} H_1 \sin\psi d\psi - 2\int_0^{\phi} H_1 \sin\psi d\psi}{\int_0^{180^\circ} H \sin\psi d\psi}$$

$$= \frac{H_1}{H}\left[1 - \frac{2\int_0^{\phi} \sin\psi d\psi}{\int_0^{180^\circ} \sin\psi d\psi}\right]$$

$$= \frac{H_1}{H}\left[1 - \frac{2(-\cos\phi + \cos 0)}{(-\cos 180^\circ + \cos 0)}\right] = (H_1/H)\cos\phi$$

But since $(H_1/H) = \sec\phi$, we have $A = 1$, which means that the average value of the electromotive force induced in the coil is independent of the roll in the vertical plane perpendicular to the magnetic meridian. The only error introduced, then, by such a motion will be caused by the failure of the potentiometer and microammeter to measure accurately the average electromotive force induced in the coil.

In conclusion it may be said that the potentiometer method was superior to the current-method because it relied on standards of resistance and electromotive force embodied in the potentiometer and standard cell instead of standards of resistance and current embodied in the portable bridge and microammeter. Because of differences both in theory and construction, the potentiometer is less likely to change than is the portable bridge, and the standard cell is far more permanent than the microammeter-calibration. In the current-method there was no assurance that the brush-resistance was the same with the earth inductor running as it was when stationary. The potentiometer-method had the further decided advantage that changes in resistance of the circuit affected, not the accuracy, but only the sensitivity of the measurement. It was felt toward the end of the cruise that the accuracy of the earth-inductor measurement compared favorably with that of the deflector.

REPORT ON THE CRUISE

Atlantic Ocean

The seventh cruise of the Carnegie began when the vessel left her wharf at Washington, under tow, at 09h May 1, 1928. Shortly after midnight on May 2 she came to anchor at the mouth of the St. Mary's River to await sunrise for beginning the swings in the lower reaches of the Potomac River. The day broke fair. Six swings under her own engine were made to detect any deviations in declination or horizontal intensity. Simultaneous observations were made ashore by the Department's field-parties, which had established numerous magnetic stations on both the Maryland and Virginia sides of the Potomac around the position previously selected for the swings. The vessel returned to same anchorage in the evening of May 2. On May 5 the Carnegie was swung again under her own engine in the morning to detect any deviations in dip and intensity, and then returned to anchorage. Simultaneous shore observations were made during all swings and comparisons. At 20h 30m anchor was weighed, and the Carnegie proceeded to Newport News, where she arrived at 08h May 6 for docking and adjusting the oscillator of the deep-sea sounding apparatus.

Leaving dry-dock at 11h May 10, the Carnegie was towed out into Hampton Roads and late in the afternoon cast off the tug and set sail while still in the entrance of Chesapeake Bay, taking a departure from Cape Henry at 18h 20m.

Newport News, Virginia, to Plymouth, England, May 10 to June 8, 1928.--Weather conditions were rather unfavorable throughout the entire time--strong winds, heavy seas, and cold and rainy weather. The course as planned was followed fairly well for the first two weeks, but during the last two weeks head-winds and baffling winds were experienced. The vessel was held off the entrance to the English Channel for ten days by easterly and southeasterly winds and gales.

After the ten days' delay with head-winds, the vessel was within a few hours' sail of picking up the first landfall at Bishop Rock, Scilly Islands. Then it began to rain, fog and mist closed in, and it was necessary to stand off to sea again. After several hours, it cleared up enough to head for the light, which was picked up at midnight. A fine fair wind then held to within ten miles of Plymouth, when it began to rain, mist and fog set in, the wind hauled ahead, and the Captain was on the point of heading back to sea again, when the headland was sighted two miles west of Plymouth Harbor. Orders were given then to take in squaresails, the engine was started, and the ship beat its way to port against a rising gale, with only one hour of daylight remaining.

Declination (D) observations with marine collimating-compass were made at 29 stations, and horizontal intensity (H) with deflector and inclination (I) with earth inductor at 12 stations. All magnetic instruments worked well. The maximum range in the inclination for a single station did not exceed 30′ as determined with earth inductor 7, using improved gimbal-ring mounting (not gyro) and microammeter without amplification. At all but three stations experimental determinations of H were made with the same method; vertical intensity (Z) was determined also at a number of stations.

Plymouth, England, to Hamburg, Germany, June 18 to 22, 1928.--The Carnegie left Plymouth at 16h 30m, June 18, being towed 15 miles off shore until sails were set, and with a fair wind, proceeded up the channel all night. The engine was operated the next day because of light winds and calm. During the night of June 19, the Carnegie passed through Dover Strait with favorable wind and tide; fortunately there was no fog, and conditions were excellent. Soon after leaving the Strait, the wind hauled ahead, however, and it was necessary to operate the engine practically continuously through the North Sea.

After making successful landfalls along the Dutch and German coasts approaching the Elbe River, and when within three hours' sail of the mouth of the river, fog and mist and rain set in, making it impossible to sight the two lightships which point the way to the mouth of the Elbe. By keeping on and watching for the traffic route as indicated by glimpses of steamers passing to southward

Atlantic Ocean--concluded

in the mist, the ship gradually headed up against the strong flood-tide and finally made out the pilot-vessel during a temporary lifting of the fog. The engine again proved its value and assistance, taking the vessel up the river against head-winds and calms, until the tugboat was met (ordered from Hamburg the previous night) while passing Borkum Riff lightship.

Magnetic declination, inclination, and horizontal intensity were determined at two sea-stations between Plymouth and the mouth of the Elbe River.

Hamburg, Germany, to Reykjavik, Iceland, July 7 to 20, 1928.--The Carnegie left the gasoline wharf at Hamburg, Germany, about noon on July 7 under tow. When the mouth of the Elbe River was reached a strong head-wind was blowing, so it was necessary to retain the tugboat for a tow of 20 miles to sea to insure getting off shore safely. At 08h 30m, July 8, the engine was started and the tow-line was cast off. By midnight it was possible to set the squaresails, so the engine was stopped and the vessel proceeded on course through the North Sea, making good progress on July 9, 10, and 11. The Shetland Islands were sighted on the afternoon of July 11 and the Faroes on the afternoon of July 12, both groups being passed to the northward.

Prevailing southwest winds prevented making the southward loop as planned between Iceland and the Faroes, and the Carnegie stood off to the northwest to cross the track of 1914 near the southeast corner of Iceland. This track was reached July 14, and then for six days head-winds were met as the vessel fought her way westward along the south coast of Iceland. The engine again proved its value, and was operated with the fore-and-aft sails as often as conditions were favorable for a total of 76 hours during six days. Without the engine it would not have been possible to make Reykjavik, and at one time it was seriously considered to proceed to St. John's, Newfoundland, omitting Iceland. As the wind shifted only between northwest and southwest, it was necessary to tack or wear ship 11 times. Usually when trying to make a headland or to pass a definite and necessary point, the weather was bad and visibility was obscured by mist and rain, making navigation difficult and exacting and entailing some risk. The anchorage at Reykjavik was reached at 08h 30m, July 20, the harbor being entered in the midst of rain squalls and low-hanging mist and fog.

The magnetic work at sea was carried out as planned, enough clear weather being present to secure good series of declination-observations at 11 stations, and of horizontal-intensity and inclination-observations at six stations.

Reykjavik, Iceland to Barbados, West Indies, July 27 to September 17, 1928.--The Carnegie left Reykjavik at noon on July 27, 1928, going out under her own power against a head-wind. By 14h the entrance point of the bay was cleared. Heading down toward Cape Farewell, good progress was made for the first four days. On July 31 the winds became unfavorable, and on the next day they went calm and it was necessary to operate the engine. By August 3 the wind had sprung up from the northeast and was blowing a strong breeze. When opposite Cape Farewell, course was set toward Newfoundland, omitting the loop toward Baffin Bay in order to gain on the schedule.

For over two weeks the vessel made her way southward, averaging about 140 miles per day, and entered the Gulf Stream on August 8, to be greeted with much warmer weather. On August 10 a gale blew from the southwest for a few hours, otherwise the period up to August 23 was marked by fine weather and moderate breezes.

On August 23 the region of light winds and calms, at latitude 16° north, was entered. For 12 days the average run was only 65 miles daily, with 97 miles as a maximum.

On August 31 in 8° north latitude because of delay through calms it was decided to change course for Barbados. Light air and calms continued until September 10, when a moderate gale blew from the southwest, the wind having changed from northeast to northwest back to north by east, then back again through northwest to southwest. This was undoubtedly the effect of the hurricane which three days later was centered over the Mona Island Passage which wrought such serious damage throughout the West Indies.

The Island of Barbados was sighted late in the afternoon of September 16. After remaining hove to off the south point of the island nearly all night, anchorage was made in Carlisle Bay at 08h 30m on the morning of September 17, only three days behind scheduled date of arriving there.

The results obtained from Reykjavik to Barbados included 77 declinations, and 25 values of both inclination and horizontal intensity.

Barbados, West Indies, to Balboa, Canal Zone, October 1 to 11, 1928.--Leaving the Bridgetown mooring buoy at 11h 30m, October 1, 1928, under her own power, the Carnegie headed up northwest to sight Martinique for a fine view of this mountainous island the next day, Mont Pelée showing up clear except for a cloud-bank at the top. For one brief moment the mist lifted enough to see the jagged peaks at the top of the cone against the white cloud-background. After squaring away for Colon at noon October 2, fine weather, with occasional squalls with heavy rain and lightning and thunder, prevailed to within 24 hours' sail of Colon. One squall took the vessel at 11 knots for two hours. The last 24 hours were made under power, calms, and head-winds. Anchorage in Limon Bay was made at 04h on the morning of October 11. Proceeding through the Canal October 11, the vessel docked successfully in the dark upon arrival at Balboa after 19h.

Fifteen declination, five inclination, and five horizontal-intensity stations were occupied.

Pacific Ocean

Balboa, Canal Zone, to Easter Island to Callao, Peru, October 25, 1928 to January 14, 1929.--Leaving Balboa at noon October 25, the Carnegie had over 24 hours of fair wind before facing two weeks of head-winds, heavy-rains, squally weather, tacking back and forth, and running the engine in an attempt to get away from the Gulf of Panama. The course stood southward for five days, then northwest for three days, with no change of wind. This made it apparent that the engine and fore-and-aft sails would have to be used on a long tack to the south in an effort to win past the coast of Ecuador, south of the Equator, into the region of the southeast trade-winds before way westward could be made. So the route was changed to go south of the Galapagos Islands instead of north. Malpelo Island was sighted on the tack to the north and was again passed near-by on the long tack to the southward. This island is an isolated, barren rock, one mile long and 846 feet high. There was more rain during these first two weeks than during all the preceding

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five months of Cruise VII. The engine operated well except for two days' delay due to a burnt-out bearing in one connecting rod. Before clearing the coast and getting a favorable change of wind for sailing the gasoline supply became very low, account being taken of requirements for the three months before a new supply could be obtained. With the shift of wind November 8 from southwest to south, the engine could be shut down, the vessel proceeding westward under sail.

Although now in the region of the Equator, the temperature of the air was anything but tropical, ranging from 20° C to 24° C. The following three months were featured by excellent weather, light winds, cool temperature, very little rain or fog, and only one gale which continued for six hours. The temperature never exceeded 24° C and was as low as 15° for only one or two days while the vessel was in the region of 40° south latitude.

Although the Carnegie passed close to the south side of the various islands in the Galapagos group, no stop was made because of the delay in leaving the Gulf of Panama. In order to make up for some of this delay the loop to Easter Island was shortened by about ten days, with no appreciable loss in the scientific data secured since it was possible to follow previous tracks on the revised loop.

The magnetic program was carried out regularly, the good weather and moderate sea giving excellent results.

On December 6 Easter Island was reached and six days were spent at anchor in the open roadstead of Cook Bay. For 13 hours during this period continuous observations were made of the magnetic elements on shore. On December 12 all work had been completed, the equipment was all on board, and plans for a farewell feast with the natives on shore had been made when the manila anchor-cable parted, causing the loss of the heavy starboard anchor; the rope had worn through on the hard-coral sandy bottom, the wind being fairly strong all the time. This happened about 10h fortunately when all were on board and in daylight. The lighter port anchor was let go at once but it dragged. Rather than risk the vessel in such close proximity to the rocks without sufficient anchors it was decided to sail and word was sent ashore to send out the supply of fresh meat. In the meantime the vessel stood out to sea and back again under easy sail and engine-power. By three o'clock in the afternoon, after all arrangements had been completed and supplies had been brought on board, sail was set for Callao, Peru.

After leaving Easter Island the Carnegie was driven 300 miles out of her course to the south by continuous head-winds. The vessel reached 40°.5 south latitude before it was possible to head up on the course, entering the southeast trade-wind region on January 5. Steady progress was then made until reaching Callao on January 14.

The last five days of the cruise were featured by unusually cloudy weather, so that the program of declination-observations twice daily was not possible. The temperature of the surface-water dropped from 21°.5 to 19° C, when the vessel was 75 miles southwest of Callao, and remained at 19° until arrival. The drop was sudden indicating entry into the cold Humboldt or Peruvian Current which flows northward as far as Ecuador.

The vessel's position was determined by star-sights early in the morning of January 14 on Regal and Arcturus, seen for brief moments through rapidly moving clouds. Course was then set for the north end of San Lorenzo Island, off Callao, and for over 50 miles this course was not changed, bringing the vessel to within one mile of the desired point at two o'clock in the afternoon. The Carnegie then proceeded under engine-power and was anchored in Callao Harbor a few hours later.

During the portion of the cruise from Balboa to Callao 96 declination, 34 inclination and horizontal-intensity observations were made.

Callao, Peru, to Papeete, Tahiti, February 5 to March 13, 1929.--The Carnegie sailed from Callao Bay under her own power at 15h 20m, February 5, using the engine until the next morning on account of calm. Here the regular observational program began and continued without interruption, except for a stop of one day at Amanu Island, until arrival at Papeete, March 13. The weather was excellent, with no storms and good breezes. The engine was not required except when the trade-wind was interrupted among the Tuamotu Islands and during the squally weather approaching Tahiti.

The magnetic work was carried out as usual. Experiments to determine horizontal intensity with the earth inductor were continued. Different coils were used, and some encouragement was given for ultimate success by the improved agreement of results with those of deflector 5. During the passage from Callao to Papeete observations were obtained as follows: 63 declination-stations, 17 inclination and horizontal-intensity stations.

Tahiti to Pago Pago and Apia, Samoa, March 20 to April 6, 1929.--The Carnegie left Papeete at 15h 35m on March 20 under her own power, heading to the northward of Moorea. The next day the wind hauled ahead and the ship was obliged to proceed southward of Huaheine and Raiatea Islands. Soundings showed new shoals south of this group, as also south of Mapehaa Island, farther to the westward. Before the western islands of the Society Group were cleared, it was necessary to use the engine on several occasions on account of light and variable winds. The engine was operated also for three days continuously before arriving at Pago Pago on April 1 at 19h 30m. The easterly trade-wind was entered March 24, and this breeze continued until March 28. The usual program of work was carried out daily.

The following observations were made: 20 declination, 6 inclination and intensity stations.

After taking on gasoline, oil, and kerosene at Pago Pago, the Carnegie left for Apia April 5, arriving the next morning, going the entire distance under engine-power.

Apia to Guam and to Yokohama, April 20 to June 7, 1929.--After completing the work of intercomparing magnetic instruments with those of the Apia Observatory and standardizing deflector 5, the ship sailed from Apia April 20 en route for Guam and proceeded northward toward the Union Islands, with light and variable winds. When only 65 miles from Apia, two stowaways came on deck out of the forepeak. It was decided to return to Apia and land the boys back home to avoid later trouble and expense, since there was no place for them on board.

Soon after leaving Apia the second time, the wind became favorable and the engine was stopped. During the following week the winds were variable and calms were frequent until April 28, when the northeast trade-wind began. This breeze continued without interruption until Guam was reached May 20. The regular daily program was carried out in spite of frequent rain-squalls, which,

Pacific Ocean--continued

however, were usually of short duration. The date May 6 was omitted due to crossing the 180th meridian of longitude.

Wake Island was sighted early on May 11, and passed within one-quarter mile of Peacock Point, the southeast point of the Island. Observations checked the position given for the island by the U.S.S. Tananger Expedition of 1923. The highest point is only 21 feet above sea-level; there are no cocoanut trees, only low-spreading umbrella trees and shrubs. Numerous birds were flying about. No signs of life or of buildings were seen. Glimpses of the beautiful green-blue lagoon seen through the break in the south side showed a considerable area free from obstructions, which might make a suitable harbor.

Rota and Guam islands were sighted on May 19, and the vessel was safely moored in Port Apra early on May 20.

Between Apia and Guam the following observations were made: 48 declination, 13 inclination and horizontal intensity stations.

The magnetic station at Sumay was reoccupied. The stay was all too brief but was much enjoyed through the very generous hospitality which was extended by Governor and Mrs. Shapley, and the Navy and Marine personnel, as also by Superintendent Mullahey of the Cable Station.

After taking on fresh water and gasoline, sail was set for Yokohama on May 25, keeping the easterly trade-wind for four days and making good daily runs. The wind then shifted to the south and varied between southeast and southwest until June 2. The positions of a typhoon were received on the night of June 1 by radio from the Manila Observatory through amateur station K1AF for the two preceding days. The wind had been increasing in force all afternoon and the sea was becoming heavier. These positions were plotted on the chart and the path predicted which the storm-center would follow. By rough estimation of its rate of travel, it seemed due to intercept the Carnegie's track within a few hours. The barometer had dropped four millimeters during the preceding eight hours and it seemed wise to head east by south and place the vessel in a safer position, to avoid the path of the storm. After running eastward for two hours, the barometer began to rise and the wind moderated so the vessel was hove to while waiting for wind and sea to moderate further. After another wait for two hours, course was again set toward the northwest, the vessel riding on the tail of the typhoon. The wind continued to shift to the right, showing that the storm had passed on to the eastward. This was the first experience in handling a storm by radio, and everything worked out like clockwork and exactly as predicted from information received within the hour by radio.

There followed four days of rough sea, contrary winds, and engine running. When within fifteen miles of the entrance to Tokio Bay, on Wednesday night, June 5, a rapidly falling barometer and rainy threatening weather made it necessary to heave the vessel to in order to judge the nature of the storm and to see the headland. After waiting two hours, conditions became worse and it was decided to get off shore to increase the margin of safety. After running the engine five hours, the wind and sea had risen to such an extent that it was necessary to heave the vessel to and ride out the typhoon when about 20 miles off shore and apparently near the center of the oncoming typhoon. About noon, the barometer appeared to reach its lowest point and became steady. The wind began to moderate and back from south toward west, the storm-center apparently having passed to the west and north. Two sails were lost and several minor accidents happened on deck, but the vessel rode through the heavy seas in good order. By early Friday morning the sea had moderated and the wind had shifted to northeast. Sail was set and by 11h Tokio Bay was entered, the vessel going up to Yokohama under engine-power and arriving at 19h 45m. The Thursday radio report from Manila gave the typhoon-center a position ten miles north of the vessel on Thursday noon.

The following observations were made while en route from Guam to Yokohama: 21 declination, 6 inclination and horizontal-intensity stations.

Yokohama, Japan, to San Francisco, California, June 24 to July 28, 1929.--After leaving Yokohama June 24, the first 10 days were featured by light variable winds and calms. The engine was operated frequently and the average day's run was about 90 miles. Advantage was taken of a smooth, calm sea on June 27 and 28 to swing the vessel for deviations. One helm for declination-observations was made on June 27 before the clouds covered the Sun; all the next day was spent in making a swing with both helms for inclination and horizontal intensity.

About July 4 the region of cold surface-water was entered with practically 100 per cent clouds, mist, fog, drizzle, and rain, which continued until July 20. The wind was somewhat stronger, but not favorable. Adverse winds during July 9 to 12 drove the vessel 300 miles to the southward of the proposed track and the weather was so cold that the copper stove was used in the cabin from July 5 to 26. On July 14 the wind freshened from the southwest and for 20 days the average daily run was about 200 miles. Better weather was met between July 22 and 29, the wind still continuing fair and strong.

During the cloudy, foggy weather the program for declination was sadly interrupted. No observations could be obtained on July 6, 7, 12, 13, 14 (I), and 19. On some of the other days, the observations were made with the Sun at such high altitudes and with such rough seas that the accuracy was seriously impaired. The alternation of ocean-stations with magnetic stations was maintained throughout the trip, except that July 14 (II) and 15 were interchanged, on account of strong wind and rough sea.

The following observations were made during the period June 24 to July 29: 40 declinations, 18 inclinations and horizontal intensities.

San Francisco to Honolulu, Territory of Hawaii, September 3 to 23, 1929.--The entire trip of 20 days was featured by light airs and calms, with only a few days of regular trade-wind, the northeast trade-wind not appearing until September 17. The extremes in daily run were 66 to 177, average being 108.8 miles. The engine was used frequently. The vessel arrived at Honolulu at noon, Monday, September 23, after an unusually quiet approach the previous night. The passage from San Francisco covered 2,186 miles.

The regular program of observation was carried out and included 10 ocean-stations, 9 stations for dip and intensity, 27 stations for declination.

Honolulu to Pago Pago, October 2 to November 18, 1929.--Leaving Honolulu, October 2, under tow, sail was set in a fair wind when three miles off the entrance to

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the harbor. For five days winds were fairly strong and favorable, from the east and northeast. On October 7 the trade-wind went light and on the eighth it shifted to the southwest. The wind continued from the westward until October 18, when it shifted to the east and with only slight interruptions remained in that quarter until Pago Pago was reached.

More calm days were experienced than usual, the engine being used for a total of about 260 hours. It performed well and saved many days' delay. No storms were encountered, although many days were rainy and squally. The last four days before reaching Pago Pago were calm and the engine was operating. Fortunately there was sufficient gasoline remaining to reach Pago Pago without delay. The ship docked on November 18, after 47.5 days at sea. The distance logged was 5,777 miles, giving 121.6 miles as the average run per day.

The usual program of magnetic work was carried out without interruption. The track as outlined was followed closely with two exceptions, where the wind was unfavorable. During the 48 days at sea, 73 declination, 23 magnetic, and 23 ocean-stations were occupied.

Table 1. Final results of ocean magnetic observations, Carnegie Cruise VII, 1928-1929

Atlantic Ocean

Date	Latitude	Longitude east	Magnetic results		
			D	I	H
1928	° ′	° ′	°	°	c.g.s.
May 11	37 06 N	285 14	7.2 W	....	....
11	37 21 N	286 52	....	....	.194
11	37 22 N	287 15	....	69.9 N	....
11	37 23 N	287 27	9.6 W	....	....
12	37 56 N	290 24	12.1 W	....	....
12	38 05 N	292 52	14.5 W	....	....
13	37 55 N	295 24	15.8 W	....	....
13	37 38 N	297 03	....	69.2 N	.193
13	37 32 N	297 32	17.5 W	....	....
15	37 08 N	303 46	....	....	.201
15	37 16 N	304 20	20.7 W	....	....
16	37 39 N	306 07	21.9 W	....	....
16	37 56 N	307 39	22.6 W	....	....
17	38 07 N	309 33	22.6 W	....	....
17	38 10 N	310 51	....	....	.202
17	38 08 N	311 20	....	66.3 N	....
17	38 07 N	311 22	23.6 W	....	....
19	40 14 N	317 20	24.9 W	....	....
19	40 46 N	318 36	....	66.2 N	.199
20	41 35 N	320 35	24.9 W	....	....
20	42 43 N	322 08	25.8 W	....	....
21	43 48 N	323 26	25.1 W	....	....
21	44 05 N	324 10	....	66.9 N	.193
21	44 12 N	324 30	25.2 W	....	....
22	44 53 N	325 47	25.7 W	....	....
22	45 46 N	327 10	25.4 W	....	....
25	43 19 N	329 18	23.4 W	....	....
26	43 46 N	330 55	23.8 W	....	....
26	43 55 N	331 22	....	65.6 N	.199
26	44 16 N	332 17	22.6 W	....	....
27	45 20 N	333 53	22.7 W	....	....
27	46 02 N	334 47	....	66.2 N	.195
28	47 39 N	337 39	21.8 W	....	....
29	48 52 N	341 29	....	67.2 N	.184
29	48 56 N	342 15	20.2 W	....	....
Jun 1	50 02 N	347 03	....	67.2 N	.183
2	49 32 N	347 40	17.5 W	....	....
4	50 11 N	348 12	....	....	.183
4	50 06 N	348 21	....	67.3 N	....
4	49 44 N	348 39	17.4 W	....	....
5	50 01 N	349 23	17.6 W	....	....
7	50 24 N	351 48	16.3 W	....	....
7	50 05 N	352 27	....	66.7 N	.186
8	49 47 N	353 55	14.9 W	....	....
1928	° ′	° ′	°	°	c.g.s.
Jun 19	50 30 N	359 17	....	....	.189
19	50 30 N	359 28	....	65.9 N	....
19	50 31 N	359 58	12.6 W	....	....
20	52 10 N	3 00	11.2 W	....	....
21	53 28 N	4 39	....	....	.176
21	53 29 N	4 46	....	68.0 N	....
Jul 8	54 16 N	7 29	....	....	.174
8	54 24 N	7 15	....	68.6 N	....
8	54 31 N	7 02	9.2 W	....	....
9	55 54 N	4 26	10.7 W	....	....
10	57 15 N	3 10	11.8 W	....	....
10	58 23 N	2 07	....	71.1 N	.156
11	61 02 N	359 10	16.1 W	....	....
12	61 46 N	356 53	17.1 W	....	....
12	62 25 N	354 04	....	74.1 N	.138
12	62 43 N	353 20	19.4 W	....	....
13	63 06 N	351 42	21.1 W	....	....
13	63 35 N	349 57	21.6 W	....	....
14	64 02 N	348 02	....	....	.126
14	63 58 N	347 36	....	75.3 N	....
15	63 36 N	345 48	24.9 W	....	....
15	63 26 N	344 51	....	74.7 N	.134
16	63 17 N	343 20	26.8 W	....	....
17	62 53 N	341 20	....	74.9 N	.133
17	62 36 N	340 58	28.3 W	....	....
27	63 49 N	336 33	31.2 W	....	....
28	63 02 N	334 43	30.2 W	....	....
28	62 01 N	332 20	33.7 W	....	....
29	60 57 N	329 35	....	76.1 N	.125
29	60 12 N	327 29	34.4 W	....	....
30	58 43 N	326 00	34.3 W	....	....
31	57 49 N	326 00	....	74.3 N	.141
31	57 50 N	326 02	33.3 W	....	....
Aug 2	58 18 N	321 46	....	....	.134
2	58 17 N	321 24	....	75.2 N	....
2	58 12 N	319 26	37.3 W	....	....
2	58 08 N	318 16	37.1 W	....	....
3	58 02 N	316 32	38.0 W	....	....
3	57 57 N	315 09	....	....	.127
3	57 56 N	314 52	....	76.4 N	....
4	53 56 N	310 45	....	75.3 N	.138
4	53 40 N	310 43	35.2 W	....	....
5	52 01 N	310 29	35.7 W	....	....
5	50 58 N	310 55	32.3 W	....	....

Table 1. Final results of ocean magnetic observations, Carnegie Cruise VII, 1928-1929--continued

Atlantic Ocean--concluded

Date	Latitude	Longitude east	Magnetic results		
			D	I	H
1928	° ′	° ′	°	°	c.g.s.
Aug 6	49 14 N	311 34	31.0 W	....	....
6	48 44 N	311 44	....	72.5 N	.160
6	47 35 N	312 05	29.6 W	....	....
7	46 18 N	311 54	29.1 W	....	....
7	45 12 N	312 38	27.5 W	....	....
8	43 43 N	313 12	26.2 W	....	....
8	43 04 N	313 05	....	68.8 N	.185
8	42 50 N	313 04	26.1 W	....	....
9	41 47 N	312 22	26.3 W	....	....
10	40 07 N	311 20	....	67.2 N	.199
10	39 20 N	311 12	23.9 W	....	....
11	38 48 N	311 09	23.7 W	....	....
11	38 09 N	311 18	23.6 W	....	....
12	37 11 N	311 27	22.8 W	....	....
12	36 54 N	312 00	....	65.3 N	.208
12	36 49 N	312 23	23.1 W	....	....
13	36 48 N	313 35	23.2 W	....	....
13	36 27 N	314 01	23.1 W	....	....
14	35 34 N	314 58	22.7 W	....	....
14	35 19 N	315 28	....	63.2 N	.217
14	34 56 N	316 22	22.8 W	....	....
15	33 52 N	317 30	22.6 W	....	....
15	33 08 N	317 55	22.2 W	....	....
16	31 40 N	318 39	21.6 W	....	....
16	31 23 N	318 48	....	....	.234
16	31 08 N	318 57	....	58.3 N	....
16	30 25 N	319 06	21.2 W	....	....
17	29 54 N	319 22	21.5 W	....	....
17	29 26 N	319 35	21.1 W	....	....
18	28 26 N	320 06	20.8 W	....	....
18	27 20 N	320 55	20.7 W	....	....
19	25 46 N	321 08	....	52.7 N	.257
19	25 19 N	320 45	20.4 W	....	....
20	24 12 N	320 27	20.2 W	....	....
20	23 27 N	320 09	19.8 W	....	....
21	22 20 N	320 14	19.6 W	....	....
21	22 00 N	320 19	....	49.3 N	.268
21	21 12 N	320 36	19.6 W	....	....
22	19 22 N	321 30	19.4 W	....	....
22	18 36 N	321 43	19.3 W	....	....
23	17 05 N	322 05	19.3 W	....	....
23	16 44 N	322 09	....	42.2 N	.283
23	16 13 N	322 09	19.2 W	....	....
25	14 53 N	321 50	....	40.2 N	.286
26	13 55 N	321 58	19.0 W	....	....
27	13 27 N	322 00	19.0 W	....	....
28	12 08 N	322 07	18.8 W	....	....
28	12 01 N	322 07	....	36.1 N	.291
29	10 47 N	322 43	18.7 W	....	....
30	9 37 N	322 50	....	32.0 N	.295
30	9 14 N	323 14	18.9 W	....	....
31	8 12 N	323 42	19.5 W	....	....
1928	° ′	° ′	°	°	c.g.s.
Sep 1	9 10 N	323 23	19.1 W	....	....
1	9 16 N	323 22	....	31.1 N	.296
2	9 39 N	323 26	18.9 W	....	....
3	10 56 N	322 53	18.8 W	....	....
4	11 18 N	322 30	18.8 W	....	....
4	11 21 N	322 11	....	35.2 N	.291
4	11 26 N	321 20	18.2 W	....	....
5	11 32 N	319 33	17.7 W	....	....
5	11 35 N	318 42	17.5 W	....	....
6	11 41 N	317 44	17.1 W	....	....
6	11 37 N	317 15	....	38.7 N	.287
6	11 33 N	317 03	16.9 W	....	....
7	11 22 N	315 57	16.4 W	....	....
7	11 22 N	315 28	16.0 W	....	....
8	11 33 N	314 58	15.7 W	....	....
8	11 35 N	314 55	....	40.0 N	.287
9	11 40 N	314 16	15.4 W	....	....
9	11 39 N	313 33	15.0 W	....	....
10	11 58 N	312 32	....	41.4 N	.285
11	13 05 N	310 31	13.7 W	....	....
11	13 13 N	310 05	13.6 W	....	....
12	13 10 N	309 33	....	44.1 N	.281
Sep 12	13 11 N	309 04	12.9 W	....	....
13	13 14 N	307 55	12.0 W	....	....
13	13 14 N	307 15	11.7 W	....	....
14	13 08 N	306 13	11.0 W	....	....
14	13 02 N	305 28	....	44.9 N	.282
14	13 00 N	305 11	10.4 W	....	....
15	12 55 N	303 57	9.3 W	....	....
15	12 56 N	303 12	9.1 W	....	....
16	13 02 N	302 00	8.2 W	....	....
16	13 01 N	301 45	....	45.6 N	.283
16	13 00 N	301 08	7.7 W	....	....
Oct 1	13 26 N	299 59	7.0 W	....	....
2	14 22 N	298 59	6.3 W	....	....
2	14 42 N	298 17	....	48.1 N	.282
2	14 44 N	297 56	6.2 W	....	....
3	14 46 N	296 43	5.6 W	....	....
4	15 00 N	294 07	....	47.9 N	.286
4	15 06 N	293 18	3.4 W	....	....
5	15 15 N	292 00	2.4 W	....	....
5	15 20 N	291 16	2.1 W	....	....
6	15 13 N	289 28	0.7 W	....	....
6	15 11 N	289 04	....	47.9 N	.291
6	15 06 N	288 14	0.1 W	....	....
7	14 49 N	286 33	1.1 E	....	....
7	14 42 N	286 18	....	46.9 N	.296
7	14 15 N	285 24	1.6 E	....	....
8	13 41 N	283 51	2.6 E	....	....
8	13 05 N	283 04	3.0 E	....	....
9	11 48 N	281 46	3.8 E	....	....
9	11 39 N	281 39	....	41.4 N	.311
10	9 56 N	280 34	4.8 E	....	....

Table 1. Final results of ocean magnetic observations, Carnegie Cruise VII, 1928-1929--continued

Pacific Ocean

Date	Latitude	Longitude east	Magnetic results		
			D	I	H
1928	° '	° '	°	°	c.g.s.
Oct 25	8 11 N	280 26	4.9 E	....	....
27	5 56 N	280 10	....	32.4 N	.319
29	4 22 N	280 15	5.9 E	....	....
29	4 18 N	280 12	....	29.4 N	.321
29	3 51 N	280 01	6.0 E	....	....
30	2 55 N	279 32	5.8 E	....	....
31	4 11 N	278 32	6.6 E	....	....
31	4 16 N	278 27	5.7 E	....	....
31	4 21 N	278 22	....	28.9 N	.321
31	5 04 N	277 47	6.5 E	....	....
Nov 1	5 57 N	277 05	6.6 E	....	....
2	4 47 N	277 34	....	....	.322
2	4 43 N	277 38	....	29.4 N	....
3	3 20 N	278 42	6.6 E	....	....
4	2 22 N	279 14	....	....	.321
4	2 24 N	279 07	....	25.5 N	....
5	1 48 N	279 16	6.8 E	....	....
5	1 10 N	279 19	6.9 E	....	....
6	0 55 N	278 46	6.6 E	....	....
6	0 24 N	278 45	7.0 E	....	....
7	0 16 S	278 19	7.5 E	....	....
7	0 23 S	278 08	....	20.0 N	.320
8	1 33 S	277 45	7.3 E	....	....
8	1 24 S	277 06	7.9 E	....	....
9	1 20 S	275 21	....	17.2 N	.322
9	1 22 S	274 34	8.6 E	....	....
10	1 34 S	273 11	8.9 E	....	....
10	1 42 S	272 33	9.0 E	....	....
11	1 51 S	271 24	9.2 E	....	....
11	1 52 S	271 14	....	13.5 N	.326
11	1 47 S	270 25	9.4 E	....	....
12	1 29 S	269 00	9.3 E	....	....
12	1 16 S	268 18	9.9 E	....	....
14	1 51 S	265 34	....	11.1 N	.330
14	1 59 S	265 24	9.9 E	....	....
15	2 26 S	264 22	9.9 E	....	....
15	2 41 S	263 41	10.2 E	....	....
16	3 02 S	261 57	....	7.1 N	.330
17	3 14 S	260 23	10.2 E	....	....
17	3 21 S	259 25	10.0 E	....	....
18	3 54 S	257 44	....	3.6 N	.333
18	4 12 S	256 37	9.8 E	....	....
19	5 06 S	254 27	9.8 E	....	....
20	6 29 S	253 27	10.0 E	....	....
20	6 42 S	253 19	....	3.1 S	.328
20	7 28 S	252 46	9.7 E	....	....
21	8 55 S	251 48	10.1 E	....	....
21	9 52 S	251 11	10.5 E	....	....
22	11 16 S	250 14	10.3 E	....	....
22	12 10 S	249 35	....	14.4 S	.319
22	12 29 S	249 18	10.5 E	....	....
23	14 44 S	247 50	11.2 E	....	....
24	16 24 S	247 05	....	22.4 S	.315
24	17 17 S	246 44	11.2 E	....	....

Date	Latitude	Longitude east	Magnetic results		
			D	I	H
1928	° '	° '	°	°	c.g.s.
Nov 25	18 51 S	246 00	11.3 E	....	....
25	19 48 S	245 51	11.0 E	....	....
26	21 32 S	245 37	....	30.8 S	.308
26	22 12 S	245 33	12.4 E	....	....
27	23 06 S	245 17	12.6 E	....	....
27	23 40 S	245 13	12.9 E	....	....
28	24 24 S	244 49	12.6 E	....	....
28	24 56 S	244 32	....	35.7 S	.302
28	25 12 S	244 28	13.3 E	....	....
29	26 23 S	244 38	13.4 E	....	....
30	28 00 S	244 51	....	39.4 S	.298
30	28 31 S	244 58	14.5 E	....	....
Dec 1	29 01 S	245 12	14.5 E	....	....
1	29 35 S	245 22	14.7 E	....	....
2	30 16 S	245 38	15.6 E	....	....
2	30 23 S	245 40	....	42.4 S	.293
2	30 59 S	246 01	15.8 E	....	....
3	31 23 S	246 58	15.6 E	....	....
3	31 33 S	247 50	16.5 E	....	....
4	31 37 S	249 15	16.4 E	....	....
4	31 13 S	250 12	....	42.4 S	.291
4	30 50 S	250 36	15.8 E	....	....
5	29 20 S	251 12	15.8 E	....	....
5	28 11 S	251 13	15.3 E	....	....
6	27 17 S	250 40	14.8 E	....	....
13	27 56 S	250 52	15.1 E	....	....
13	28 02 S	250 49	....	38.6 S	.294
13	28 37 S	250 54	14.5 E	....	....
14	29 08 S	251 03	15.6 E	....	....
16	32 00 S	249 15	16.0 E	....	....
16	31 58 S	249 45	16.5 E	....	....
17	31 51 S	250 17	16.1 E	....	....
17	31 50 S	250 26	....	43.3 S	.288
17	31 39 S	250 53	15.9 E	....	....
18	31 45 S	250 51	15.9 E	....	....
19	32 19 S	252 30	17.6 E	....	....
19	32 34 S	252 40	....	43.1 S	.287
20	33 49 S	253 13	17.5 E	....	....
20	34 21 S	253 33	18.4 E	....	....
21	34 52 S	254 12	18.5 E	....	....
21	35 03 S	254 23	....	45.3 S	.282
21	35 41 S	255 06	18.8 E	....	....
22	37 12 S	256 05	19.1 E	....	....
23	38 29 S	256 54	....	48.4 S	.275
23	38 58 S	257 30	19.8 E	....	....
24	39 44 S	258 44	20.9 E	....	....
26	40 22 S	262 25	21.5 E	....	....
27	39 46 S	264 01	....	47.0 S	.274
27	39 29 S	264 28	21.2 E	....	....
28	38 39 S	265 33	20.2 E	....	....
28	37 57 S	266 12	20.5 E	....	....
29	36 52 S	266 49	....	43.3 S	.274
29	36 04 S	267 15	19.7 E	....	....
30	34 48 S	268 00	19.1 E	....	....

Table 1. Final results of ocean magnetic observations, *Carnegie* Cruise VII, 1928-1929--continued

Pacific Ocean--continued

Date	Latitude	Longitude east	Magnetic results		
			D	I	H
1928	° ′	° ′	°	°	c.g.s.
Dec 30	33 58 S	268 37	18.5 E	....	....
31	32 38 S	269 50	18.0 E	....	....
31	32 33 S	269 58	....	37.4 S	.277
1929					
Jan 1	32 13 S	270 47	17.4 E	....	....
2	31 53 S	271 13	....	36.1 S	.277
3	31 54 S	271 56	17.9 E	....	....
4	31 49 S	272 33	....	35.3 S	.274
4	31 35 S	272 58	17.6 E	....	....
5	30 36 S	273 42	16.7 E	....	....
6	29 31 S	274 17	16.4 E	....	....
6	29 10 S	274 28	....	31.8 S	.276
6	28 23 S	274 57	15.2 E	....	....
8	25 10 S	277 36	....	24.6 S	.278
8	24 40 S	277 56	13.6 E	....	....
9	23 20 S	278 40	....	21.8 S	.281
10	21 06 S	279 44	12.0 E	....	....
11	19 28 S	280 31	11.2 E	....	....
11	18 53 S	280 46	....	13.1 S	.288
11	18 38 S	280 50	10.8 E	....	....
12	16 09 S	281 31	10.2 E	....	....
13	14 33 S	281 59	9.6 E	....	....
13	14 21 S	282 02	....	4.0 S	.297
13	13 46 S	282 06	9.1 E	....	....
14	12 45 S	282 35	8.6 E	....	....
Feb 6	12 00 S	281 26	8.7 E	....	....
7	10 34 S	280 21	9.1 E	....	....
7	10 19 S	280 09	....	2.5 N	.308
7	10 05 S	279 30	9.1 E	....	....
8	10 00 S	278 04	9.3 E	....	....
8	10 00 S	277 21	9.8 E	....	....
9	10 15 S	276 04	9.7 E	....	....
9	10 21 S	275 54	....	0.0	.311
9	10 31 S	275 35	10.0 E	....	....
11	10 35 S	274 17	10.5 E	....	....
11	10 40 S	273 58	....	1.6 S	.311
11	10 42 S	273 43	10.6 E	....	....
12	10 58 S	272 49	10.6 E	....	....
12	11 21 S	272 01	11.0 E	....	....
13	12 14 S	270 51	11.3 E	....	....
13	12 25 S	270 36	....	6.6 S	.310
13	12 57 S	269 41	11.4 E	....	....
14	14 06 S	268 09	11.8 E	....	....
14	14 46 S	267 11	11.9 E	....	....
15	15 54 S	265 29	12.4 E	....	....
15	15 53 S	265 22	....	15.9 S	.306
15	15 42 S	264 31	12.4 E	....	....
16	15 20 S	262 46	12.0 E	....	....
16	15 06 S	261 38	12.2 E	....	....
17	14 38 S	259 47	11.7 E	....	....
17	14 44 S	259 33	....	16.1 S	.308
17	14 40 S	258 26	11.6 E	....	....
18	14 20 S	256 51	11.6 E	....	....
18	14 12 S	256 09	11.2 E	....	....
1929	° ′	° ′	°	°	c.g.s.
Feb 19	13 45 S	254 45	11.3 E	....	....
19	13 31 S	253 53	....	15.8 S	.313
19	13 28 S	253 30	11.2 E	....	....
20	13 04 S	252 09	11.1 E	....	....
20	12 53 S	251 22	10.7 E	....	....
21	12 36 S	250 25	10.3 E	....	....
21	12 32 S	250 08	....	15.0 S	.318
21	12 34 S	249 22	10.6 E	....	....
22	12 35 S	247 57	10.6 E	....	....
22	12 35 S	247 09	10.4 E	....	....
23	12 33 S	245 33	10.4 E	....	....
23	12 32 S	245 11	....	16.6 S	.320
23	12 32 S	244 14	10.2 E	....	....
24	12 38 S	242 46	9.7 E	....	....
24	12 44 S	241 58	9.9 E	....	....
25	12 45 S	240 59	10.2 E	....	....
25	12 45 S	240 46	....	17.2 S	.320
25	13 02 S	240 11	10.1 E	....	....
26	13 03 S	238 59	10.0 E	....	....
26	13 05 S	238 06	10.0 E	....	....
27	13 06 S	236 32	10.0 E	....	....
27	13 37 S	235 37	....	20.1 S	.323
27	13 48 S	235 21	9.9 E	....	....
28	14 44 S	234 06	10.4 E	....	....
28	15 17 S	233 23	10.7 E	....	....
Mar 1	16 11 S	232 21	10.5 E	....	....
1	16 21 S	232 08	....	25.1 S	.323
1	16 55 S	231 33	10.7 E	....	....
2	16 59 S	230 26	10.7 E	....	....
2	17 01 S	229 46	10.8 E	....	....
3	17 08 S	228 41	10.4 E	....	....
3	17 09 S	228 28	....	26.9 S	.324
3	17 08 S	227 51	10.9 E	....	....
4	17 10 S	226 48	10.8 E	....	....
4	17 09 S	226 13	10.9 E	....	....
5	17 07 S	225 06	10.9 E	....	....
5	17 06 S	224 52	....	27.7 S	.325
5	17 04 S	224 17	10.7 E	....	....
6	17 11 S	223 27	10.8 E	....	....
7	17 16 S	221 43	10.5 E	....	....
7	17 21 S	221 22	....	29.0 S	.324
7	17 32 S	220 33	10.9 E	....	....
8	17 38 S	219 17	10.8 E	....	....
9	17 36 S	218 12	10.9 E	....	....
10	18 05 S	216 27	11.0 E	....	....
10	18 04 S	216 12	....	30.8 S	.331
11	18 04 S	214 32	11.1 E	....	....
11	18 14 S	213 42	11.4 E	....	....
12	17 58 S	212 34	11.2 E	....	....
12	17 54 S	212 17	....	31.4 S	.330
12	17 44 S	211 27	10.5 E	....	....
21	16 45 S	209 23	10.6 E	....	....
22	17 15 S	208 24	10.7 E	....	....
22	17 30 S	208 16	....	31.2 S	.336

Table 1. Final results of ocean magnetic observations, Carnegie Cruise VII, 1928-1929--continued

Pacific Ocean--continued

Date	Latitude	Longitude east	Magnetic results		
			D	I	H
1929	° ′	° ′	°	°	c.g.s.
Mar 22	17 39 S	208 09	10.8 E	....	....
23	17 12 S	207 28	10.9 E	....	....
24	16 58 S	206 42	10.6 E	....	....
24	16 54 S	206 32	....	30.9 S	.336
24	16 52 S	205 50	10.7 E	....	....
25	16 36 S	204 25	10.5 E	....	....
25	16 25 S	203 23	10.5 E	....	....
26	16 12 S	202 02	10.4 E	....	....
26	16 10 S	201 54	....	30.1 S	.340
27	15 45 S	199 47	10.3 E	....	....
27	15 39 S	199 05	10.5 E	....	....
28	15 33 S	198 16	10.1 E	....	....
28	15 33 S	198 10	....	29.8 S	.344
29	15 19 S	196 55	10.4 E	....	....
29	15 09 S	196 10	10.4 E	....	....
30	14 50 S	194 55	10.3 E	....	....
30	14 46 S	194 39	....	29.5 S	.347
30	14 42 S	193 48	10.4 E	....	....
31	14 41 S	192 29	10.5 E	....	....
31	14 41 S	191 39	10.5 E	....	....
Apr 1	14 32 S	190 28	10.3 E	....	....
1	14 29 S	190 14	....	29.0 S	.347
1	14 20 S	189 34	10.5 E	....	....
20	13 30 S	188 18	10.2 E	....	....
21	12 50 S	188 15	10.1 E	....	....
23	11 45 S	188 11	10.0 E	....	....
23	11 35 S	188 15	....	24.6 S	.358
24	8 56 S	189 05	9.3 E	....	....
24	8 20 S	188 45	9.5 E	....	....
25	7 58 S	188 12	9.4 E	....	....
25	7 53 S	188 11	....	....	.358
25	7 48 S	188 11	....	18.1 S	....
25	7 14 S	188 02	9.8 E	....	....
26	6 46 S	187 39	9.4 E	....	....
26	6 19 S	187 35	9.3 E	....	....
27	5 24 S	187 36	9.2 E	....	....
27	5 20 S	187 36	....	12.3 S	.360
27	4 49 S	187 34	9.3 E	....	....
28	3 54 S	187 24	9.1 E	....	....
28	3 23 S	187 12	9.3 E	....	....
29	2 21 S	186 36	9.2 E	....	....
29	2 04 S	186 33	....	5.9 S	.356
29	1 14 S	186 24	9.2 E	....	....
30	0 05 N	186 06	9.3 E	....	....
30	0 54 N	185 46	9.1 E	....	....
May 1	2 04 N	185 07	9.4 E	....	....
1	2 41 N	184 47	....	2.8 N	.347
1	2 57 N	184 36	9.2 E	....	....
2	4 14 N	183 46	9.1 E	....	....
3	5 53 N	182 43	9.4 E	....	....
3	6 12 N	182 30	....	9.6 N	.338
3	6 59 N	181 57	9.1 E	....	....
4	7 59 N	181 17	9.4 E	....	....
5	10 07 N	179 50	9.6 E	....	....
1929	° ′	° ′	°	°	c.g.s.
May 5	10 26 N	179 38	....	16.4 N	.326
5	11 29 N	178 57	9.4 E	....	....
7[a]	13 09 N	177 41	9.6 E	....	....
7	13 59 N	176 47	9.7 E	....	....
8	15 05 N	175 23	8.9 E	....	....
8	15 16 N	175 03	....	23.3 N	.312
8	15 38 N	174 03	9.0 E	....	....
9	16 20 N	172 17	8.4 E	....	....
9	16 56 N	171 13	8.3 E	....	....
10	18 06 N	169 42	7.7 E	....	....
10	18 34 N	168 44	....	26.0 N	.309
10	18 41 N	168 23	7.1 E	....	....
11	19 13 N	167 01	6.8 E	....	....
11	19 30 N	165 58	7.2 E	....	....
12	20 16 N	164 03	....	27.6 N	.304
12	20 16 N	163 04	5.0 E	....	....
13	20 13 N	161 33	4.6 E	....	....
13	20 13 N	160 30	4.7 E	....	....
14	19 52 N	159 04	4.1 E	....	....
14	19 42 N	158 47	....	25.7 N	.318
14	19 14 N	157 45	3.7 E	....	....
15	18 44 N	156 24	3.3 E	....	....
15	18 21 N	155 21	3.1 E	....	....
16	17 45 N	153 58	2.8 E	....	....
16	17 35 N	153 39	....	21.6 N	.329
16	17 09 N	152 50	2.7 E	....	....
17	16 20 N	151 18	2.5 E	....	....
17	15 49 N	150 13	2.3 E	....	....
18	15 11 N	148 51	2.1 E	....	....
18	14 46 N	147 59	....	16.4 N	.343
18	14 36 N	147 37	2.0 E	....	....
19	14 08 N	146 17	2.0 E	....	....
25	13 49 N	144 32	1.7 E	....	....
26	15 22 N	144 12	1.1 E	....	....
26	15 43 N	144 09	....	17.9 N	.347
26	16 46 N	144 05	1.0 E	....	....
27	18 12 N	144 03	0.5 E	....	....
27	19 16 N	144 00	0.3 E	....	....
28	20 49 N	144 07	0.2 E	....	....
28	21 44 N	144 13	....	28.3 N	.334
28	21 59 N	144 14	0.7 W	....	....
29	23 07 N	144 12	1.0 W	....	....
29	23 52 N	144 00	1.1 W	....	....
30	24 50 N	144 02	1.6 W	....	....
30	25 04 N	144 04	....	34.1 N	.325
30	25 34 N	144 12	1.2 W	....	....
31	26 12 N	144 23	1.7 W	....	....
Jun 1	27 59 N	144 04	2.6 W	....	....
1	28 12 N	144 01	....	38.5 N	.318
1	28 55 N	143 52	2.6 W	....	....
2	30 00 N	143 58	3.3 W	....	....
2	30 05 N	143 55	....	41.1 N	.315
2	30 28 N	144 16	2.9 W	....	....
3	30 52 N	144 19	3.5 W	....	....

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[a] May 6 omitted on account of crossing 180th meridian

Table 1. Final results of ocean magnetic observations, Carnegie Cruise VII, 1928-1929--continued

Pacific Ocean--continued

Date	Latitude	Longitude east	Magnetic results		
			D	I	H
1929	° ′	° ′	°	°	c.g.s.
Jun 4	32 11 N	142 53	4.2 W	....	....
4	32 30 N	142 28	....	44.6 N	.308
4	32 58 N	141 55	4.7 W	....	....
5	33 41 N	141 20	5.0 W	....	....
25	34 47 N	140 46	5.1 W	....	....
25	35 02 N	141 16	5.0 W	....	....
26	35 51 N	141 49	....	48.9 N	.297
26	36 11 N	142 33	5.4 W	....	....
27	36 34 N	143 27	5.2 W	....	....
27	36 39 N	143 58	5.0 W	....	....
28	36 42 N	145 08	4.9 W	....	....
28	36 44 N	145 26	....	49.5 N	.291
29	38 04 N	145 34	5.3 W	....	....
30	38 05 N	146 34	4.8 W	....	....
30	38 06 N	146 53	....	50.8 N	.285
30	38 20 N	147 18	4.8 W	....	....
Jul 1	39 05 N	148 02	5.5 W	....	....
2	39 36 N	149 09	4.6 W	....	....
2	39 42 N	149 17	....	52.4 N	.278
2	40 02 N	149 56	5.1 W	....	....
3	40 28 N	151 32	4.5 W	....	....
4	41 27 N	153 34	....	53.6 N	.270
5	42 23 N	155 18	2.7 W	....	....
6	43 32 N	158 03	....	55.4 N	.259
8	46 44 N	162 20	1.0 W	....	....
8	46 51 N	162 40	....	58.6 N	.245
9	47 03 N	166 18	0.9 E	....	....
10	46 53 N	169 01	3.2 E	....	....
10	46 48 N	169 13	....	58.4 N	.245
11	46 06 N	171 30	3.6 E	....	....
11	45 47 N	171 59	3.0 E	....	....
12	45 11 N	172 53	....	57.2 N	.245
14	47 56 N	177 44	....	59.9 N	.234
14[b]	49 03 N	182 46	....	61.3 N	.228
14[b]	49 25 N	183 57	9.9 E	....	....
15	50 18 N	186 44	12.6 E	....	....
15	50 40 N	188 15	11.7 E	....	....
16	51 07 N	191 46	14.2 E	....	....
16	51 15 N	192 11	....	63.9 N	.218
17	52 29 N	199 08	17.8 E	....	....
18	52 40 N	203 29	20.8 E	....	....
18	52 38 N	204 00	....	67.1 N	.201
18	52 27 N	205 17	20.8 E	....	....
20	50 27 N	213 30	23.9 E	....	....
20	50 25 N	213 37	....	67.3 N	.204
20	49 49 N	214 36	23.3 E	....	....
21	48 20 N	216 43	23.2 E	....	....
21	47 34 N	217 53	22.8 E	....	....
22	46 24 N	219 39	21.4 E	....	....
22	45 47 N	220 30	....	65.3 N	.219
22	45 28 N	220 53	21.1 E	....	....
23	44 26 N	222 11	21.8 E	....	....
23	43 54 N	222 53	20.8 E	....	....
24	42 47 N	224 27	....	63.6 N	.230

Date	Latitude	Longitude east	Magnetic results		
			D	I	H
1929	° ′	° ′	°	°	c.g.s.
Jul 24	42 47 N	224 27	20.4 E	....	....
24	42 08 N	225 29	19.4 E	....	....
25	40 44 N	227 24	19.9 E	....	....
26	39 49 N	229 56	19.4 E	....	....
26	39 43 N	230 10	....	62.3 N	.242
26	39 24 N	231 22	19.1 E	....	....
27	38 54 N	233 39	18.5 E	....	....
Sep 5	35 44 N	235 15	....	59.7 N	.258
5	35 05 N	234 36	17.2 E	....	....
6	33 58 N	233 46	16.6 E	....	....
6	33 28 N	233 16	16.6 E	....	....
7	32 32 N	232 17	15.9 E	....	....
7	32 29 N	232 13	....	56.0 N	.269
8	31 22 N	230 45	15.3 E	....	....
9	30 39 N	229 34	15.5 E	....	....
9	30 31 N	229 19	....	53.5 N	.277
9	30 06 N	228 38	14.8 E	....	....
10	29 26 N	227 39	14.6 E	....	....
11	28 17 N	225 50	....	50.6 N	.282
11	28 05 N	225 23	14.2 E	....	....
12	27 36 N	224 05	14.0 E	....	....
13	27 13 N	222 53	14.1 E	....	....
13	27 06 N	222 30	....	48.5 N	.285
14	26 38 N	220 57	13.3 E	....	....
15	26 39 N	219 56	14.0 E	....	....
15	26 32 N	219 39	....	47.4 N	.285
15	26 24 N	219 07	13.4 E	....	....
16	26 16 N	218 08	13.1 E	....	....
17	25 21 N	216 46	12.5 E	....	....
17	25 13 N	216 33	....	45.8 N	.286
17	24 52 N	216 00	12.5 E	....	....
18	24 08 N	214 42	12.7 E	....	....
18	23 50 N	213 53	12.0 E	....	....
19	23 28 N	212 02	12.0 E	....	....
19	23 25 N	211 42	....	42.9 N	.288
20	22 56 N	208 58	11.9 E	....	....
20	22 43 N	208 06	11.4 E	....	....
21	22 21 N	206 48	11.5 E	....	....
21	22 18 N	206 35	....	40.7 N	.288
21	22 13 N	205 56	11.4 E	....	....
22	21 51 N	204 39	11.2 E	....	....
22	21 39 N	203 55	11.1 E	....	....
23	21 21 N	202 36	11.1 E	....	....
Oct 2	21 45 N	201 30	11.2 E	....	....
3	23 16 N	200 40	11.3 E	....	....
3	24 01 N	200 16	11.5 E	....	....
4	25 47 N	199 40	11.8 E	....	....
4	26 04 N	199 35	....	44.0 N	.276
4	27 04 N	199 19	12.2 E	....	....
5	28 50 N	198 53	12.7 E	....	....
5	29 40 N	198 41	12.8 E	....	....
6	31 13 N	198 48	13.2 E	....	....
6	31 55 N	199 03	....	49.8 N	.266
6	32 06 N	199 06	13.4 E	....	....

[b] July 14 repeated on account of crossing 180th meridian

Table 1. Final results of ocean magnetic observations, Carnegie Cruise VII, 1928-1929--concluded

Pacific Ocean--concluded

Date	Latitude	Longitude east	Magnetic results		
			D	I	H
1929	° ′	° ′	°	°	c.g.s.
Oct 7	32 40 N	199 18	13.7 E	....	....
7	33 06 N	199 27	13.9 E	....	....
8	34 04 N	199 42	14.0 E	....	....
8	34 11 N	199 51	....	52.0 N	.258
9	34 06 N	202 40	14.5 E	....	....
10	33 41 N	205 07	14.7 E	....	....
10	33 39 N	205 13	....	52.5 N	.259
10	33 35 N	206 03	14.9 E	....	....
11	33 37 N	207 57	15.2 E	....	....
11	33 34 N	209 12	15.6 E	....	....
12	33 23 N	211 30	15.4 E	....	....
12	33 20 N	211 56	....	53.5 N	.260
13	33 28 N	214 27	15.8 E	....	....
14	33 32 N	216 13	16.1 E	....	....
14	33 24 N	217 06	....	54.1 N	.264
15	31 56 N	219 02	15.4 E	....	....
16	29 41 N	220 24	13.9 E	....	....
16	29 24 N	220 32	....	50.8 N	.278
16	28 31 N	220 57	14.3 E	....	....
17	27 33 N	221 41	13.5 E	....	....
18	26 12 N	223 05	13.5 E	....	....
18	26 06 N	223 02	....	47.6 N	.288
19	25 00 N	222 20	13.3 E	....	....
20	23 38 N	221 57	12.5 E	....	....
20	23 25 N	221 48	....	44.3 N	.295
20	22 41 N	221 34	12.4 E	....	....
21	21 19 N	221 23	11.7 E	....	....
21	20 41 N	221 30	11.5 E	....	....
22	18 55 N	221 46	11.0 E	....	....
22	18 05 N	222 07	....	37.3 N	.308
22	17 48 N	222 17	10.4 E	....	....
23	16 18 N	222 55	10.4 E	....	....
23	15 41 N	223 10	10.1 E	....	....
24	13 46 N	223 37	....	30.4 N	.319
25	12 41 N	222 27	9.7 E	....	....
26	11 33 N	221 34	9.5 E	....	....
26	11 24 N	221 25	....	26.3 N	.322
26	11 03 N	221 03	9.2 E	....	....
27	10 10 N	220 20	9.2 E	....	....
27	9 46 N	219 58	8.9 E	....	....
28	8 50 N	219 26	8.7 E	....	....
28	8 42 N	219 21	....	21.3 N	.329
1929	° ′	° ′	°	°	c.g.s.
28	8 27 N	219 11	9.0 E	....	....
29	7 50 N	218 38	8.8 E	....	....
29	7 35 N	218 23	8.7 E	....	....
30	7 14 N	217 47	8.7 E	....	....
30	7 10 N	217 41	....	18.0 N	.330
30	6 53 N	217 04	8.7 E	....	....
31	6 43 N	216 38	8.7 E	....	....
Nov 1	5 43 N	215 30	8.4 E	....	....
1	5 44 N	215 27	....	15.1 N	.332
2	4 50 N	212 53	8.7 E	....	....
3	4 24 N	211 17	8.3 E	....	....
3	4 23 N	211 03	....	11.8 N	.335
Nov 3	4 07 N	210 36	8.3 E	....	....
4	3 09 N	210 20	8.2 E	....	....
5	1 23 N	208 50	8.4 E	....	....
5	0 27 N	208 21	....	3.5 N	.340
5	0 11 N	208 13	8.4 E	....	....
6	1 36 S	207 41	8.5 E	....	....
6	2 42 S	207 28	8.4 E	....	....
7	4 24 S	207 01	8.7 E	....	....
7	4 39 S	206 51	....	7.5 S	.348
7	5 17 S	206 13	8.6 E	....	....
8	6 24 S	205 10	8.9 E	....	....
8	6 58 S	204 33	9.0 E	....	....
9	7 47 S	203 31	9.0 E	....	....
9	7 56 S	203 19	....	15.6 S	.350
9	8 23 S	202 40	9.4 E	....	....
10	8 52 S	202 09	9.2 E	....	....
11	9 21 S	201 08	9.3 E	....	....
12	9 57 S	199 30	10.0 E	....	....
12	10 08 S	199 15	....	20.0 S	.351
13	11 12 S	197 32	9.5 E	....	....
14	11 30 S	196 58	9.5 E	....	....
14	11 32 S	196 56	....	22.7 S	.350
14	11 42 S	196 15	9.6 E	....	....
15	12 01 S	195 13	9.7 E	....	....
16	12 37 S	193 31	9.9 E	....	....
16	12 44 S	193 14	....	25.8 S	.353
16	13 04 S	192 33	10.1 E	....	....
17	13 32 S	191 45	10.2 E	....	....
18	14 03 S	190 07	9.2 E	....	....
18	14 08 S	189 48	....	29.3 S	.348

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FIGURES 1-5

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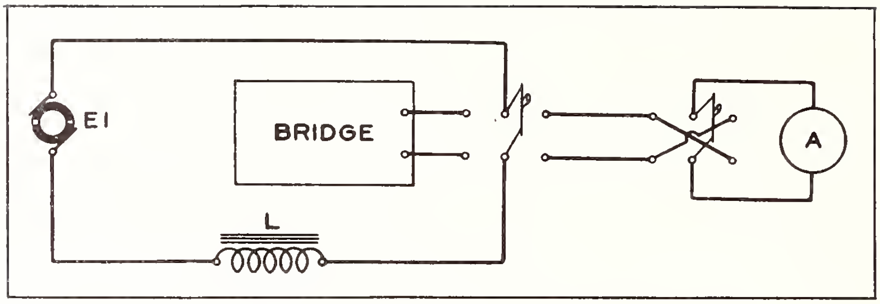

Fig. 1. Diagrammatic sketch of earth-inductor setup

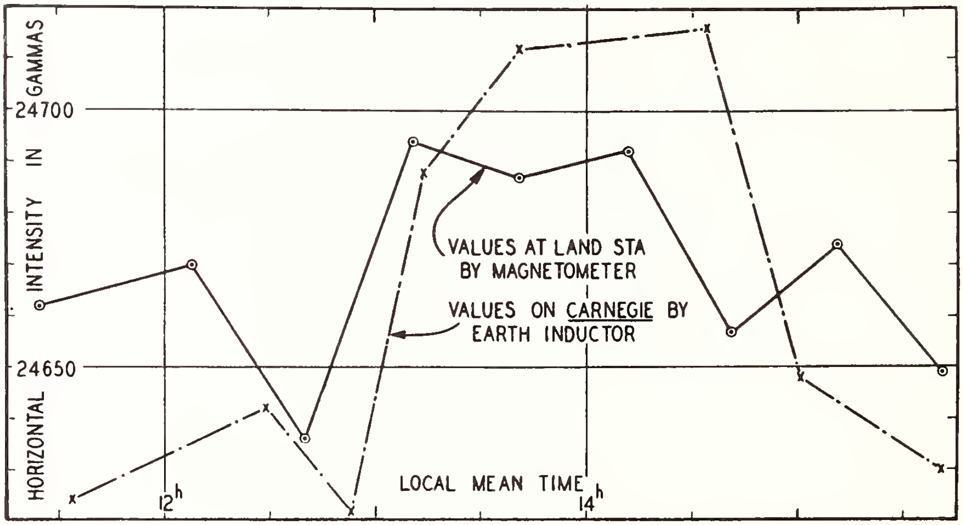

Fig. 2. Horizontal-intensity values determined on shore and aboard the Carnegie, July 31, 1929

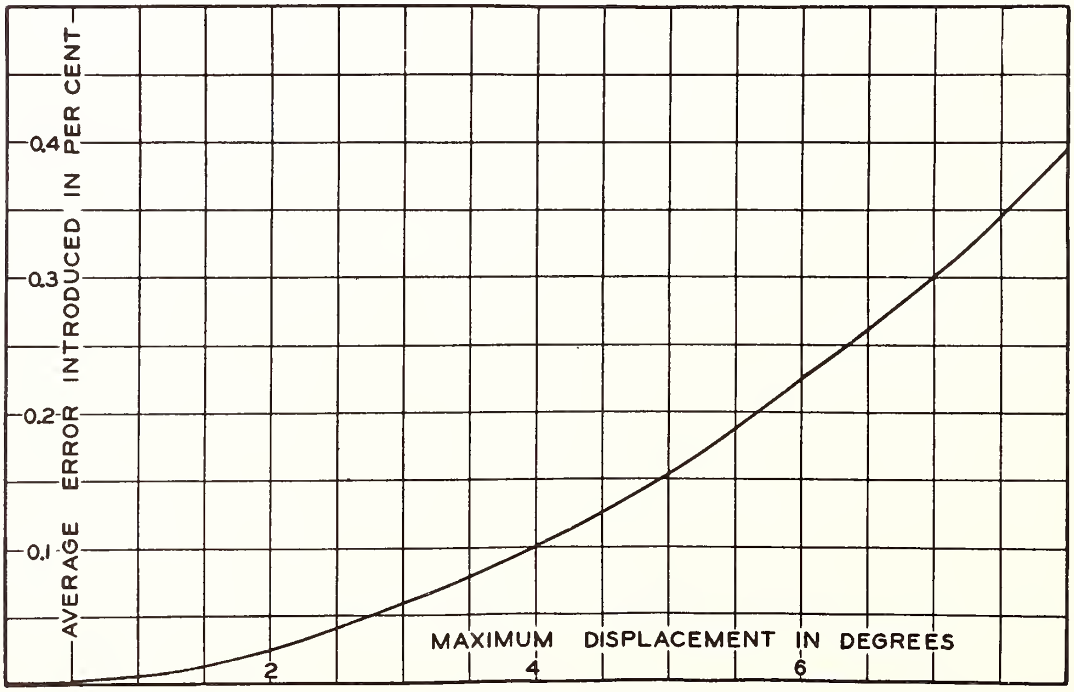

Fig. 3. Variation of average error with maximum displacement of inductor-coil axis from true vertical

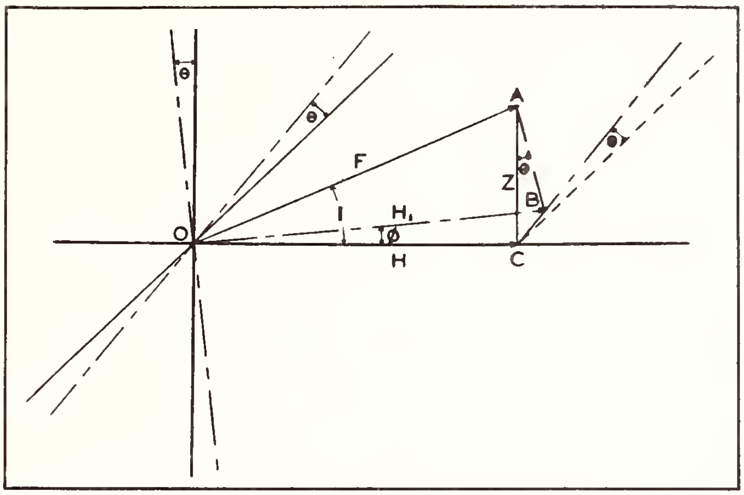

Fig. 4. Diagram to show theory of inductor

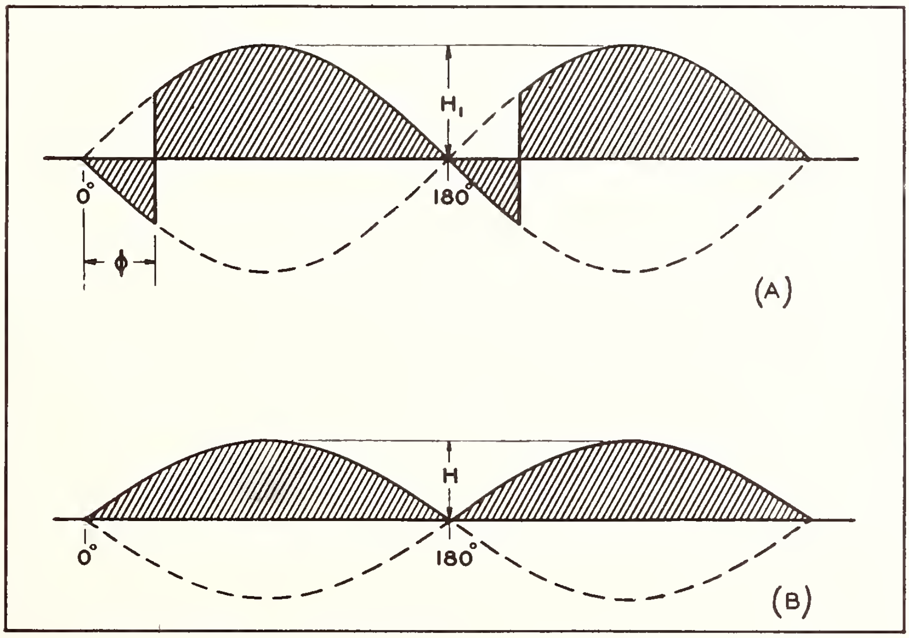

Fig. 5. Diagrammatic sketch of electromotive force induced in coil: (A) when in a roll of θ, and (B) when its axis is vertical